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RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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Cross-stitching CoCo Style
Do You Hear What I Hear?

FROLIC:

A Festival of Lights
Photographing a CRT Screen
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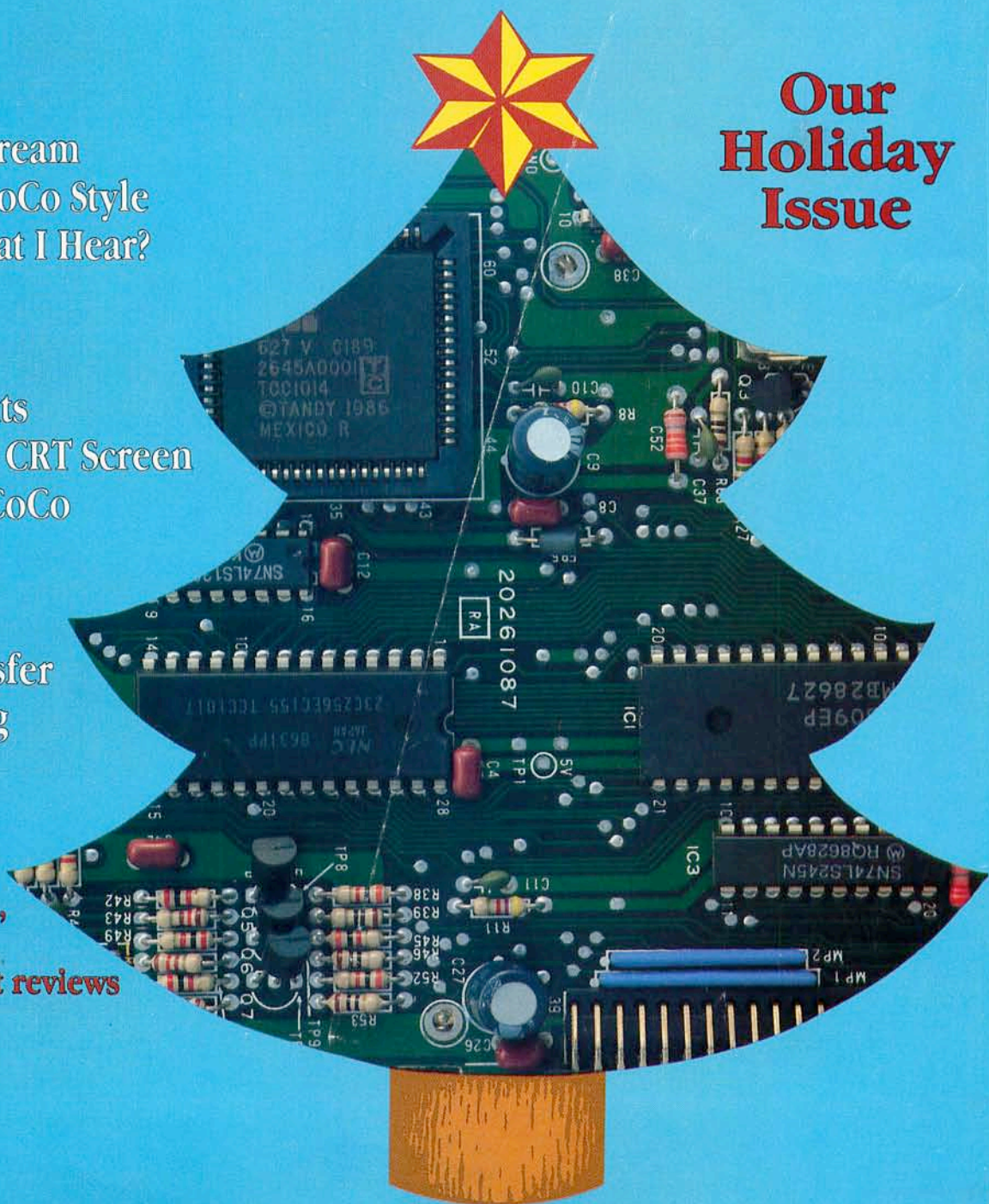
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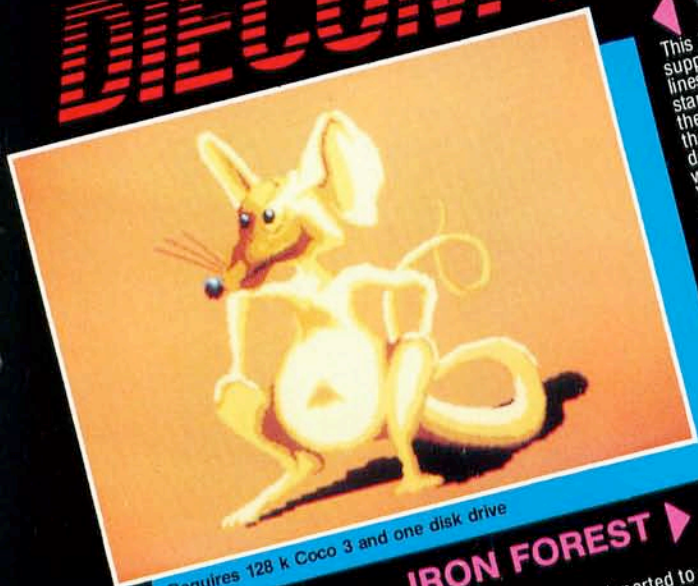
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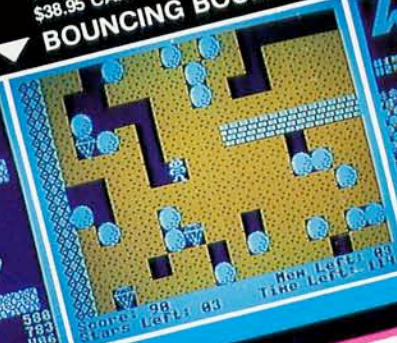
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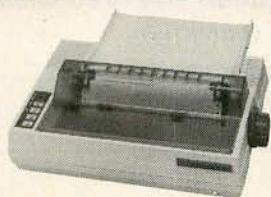
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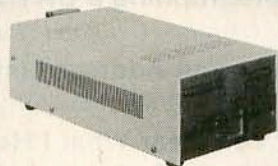
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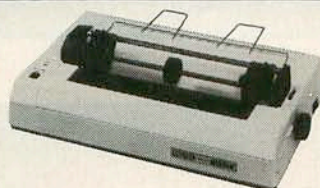
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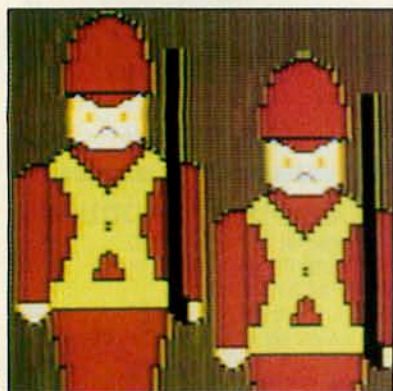
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NEXT MONTH: Ring in the new year with THE RAINBOW's Beginners Issue! If you are new to computing, we'll teach you the ins and outs of getting the most from your Color Computer. Discover handy hints and tips, and learn to use commands with confidence — get a handle on those peeks and pokes. For all of you old-timers, we'll have our usual store of features, utilities, Q & A columns and more. THE RAINBOW is your source of information for the CoCo 1, 2 or 3, whether you're a novice or an experienced user. Start 1988 right!

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RAINBOW

December 1987

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Lawrence C. Falk

Managing Editor Jutta Kapfhammer
Associate Editor Jo Anna Wittman Arnott
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Steve Blyn, Tony DiStefano,
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Art Director Heidi Maxedon
Designers Robert Hatfield, Jr., Rita Lawrence,
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Typesetter Jody Doyle

Falsoft, Inc.

President Lawrence C. Falk
General Manager Patricia Hirsch
Asst. General Mgr. for Finance Donna Shuck
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Executive Editor James E. Reed
Editorial Coordinator Jutta Kapfhammer
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Advertising Representative Belinda Kirby
Advertising Representative Kim Vincent
Advertising Assistant Debbie Baxter
(502) 228-4492

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Poring Over Reader Responses

Editor:

In your September "Building a Rainbow" editorial, you were musing over the future direction of the magazine and asked for input from readers. As a research scientist I use various high-powered micro's professionally, so the CoCo at home is mainly for entertainment and self-education.

The main reason for subscribing is the ads. I skim through each new issue looking for new or unique products. The RAINBOW is the only source of information on products not produced or sold by Tandy. Since acquiring my first Color Computer in 1980, I have spent over \$13,000 on CoCos and peripheral products. This figure is accurate because I keep detailed records on a database program (*Homebase*) purchased from a magazine ad in the now defunct *Color Computer News*. Over 90 percent of these purchases were from magazine ads and the rest direct from Tandy.

The second most important service provided by RAINBOW is technical information of the problem-solving kind. This comes mainly from contributing editor departments and occasionally from letters from other subscribers. For example, when I recently purchased OS-9 Level II from one of your advertisers, I was able to patch my startup routine to set the dual disk drives to 6 ms step rates, include a rapid drive turn-off sequence, and install several windowing functions based on tips and examples from "KISSable OS-9." Another recent useful item was information on how to patch the *VIP Writer* disk to work with the CoCo 3, without which I would not be able to write this letter. Using the same technique I was also able to patch *VIP Database* and *VIP Terminal* to work with the CoCo 3. Which leads to the suggestion — why not publish some of the tech tips uploaded to Delphi instead of just reporting on their existence?

Your third major function for me is the publication of utility programs that add to the ease of use and general enjoyment of a home computer. If the program is short, I type directly from the listings; if not, I send for a copy of RAINBOW ON DISK. With few exceptions, programs with listings longer than one or two pages are too tedious to bother with. The one exception that imme-

diately comes to mind is the outstanding multi-color Christmas card printing program that appeared in the December 1984 issue that was worth every agonizing hour spent typing and debugging.

Finally, due to the present availability of good commercial software for the CoCo, the least important function is the publication in print of submitted programs unless they have some unusual or novel feature not otherwise available. This should be left to tape or disk with just a description of purpose and any special operating instructions printed. The "Novices Niche" might be the exception to these comments.

Although my view of RAINBOW may be unique, I doubt it. The Color Computer has been on the market for almost eight years now and the number of experienced users probably far exceeds the number of newcomers. Even with the current dearth of software for CoCo 3, most of us will rely on commercial sources or downloads from CoCo SIGs rather than copy printed programs. So keep the ads coming, even if you have to lower rates and shed staff or increase subscription rates to do so. The future of the Color Computer depends on it.

Kenneth R. Hill
Severna Park, MD

The two following letters were chosen to represent the hundreds of people who have written with a different view regarding the publication of program listings.

Keep the Listings!

Editor:

I read the "Building a Rainbow" article in the September issue, and felt that I should express my opinions. Your statement that listings might be eliminated in favor of RAINBOW ON TAPE or RAINBOW ON DISK greatly worried me that such a thing could even be considered. The main reason I started reading THE RAINBOW was for the listings! I have learned almost everything I know about programming from typing in those listings and modifying them to see what did what and how it did it. Explaining

something in an article is fine, but it doesn't even come close to being able to *use* the information directly and see exactly what's going on.

In relation to your concern for novices, you must realize that there are many novices who just don't have the money to buy RAINBOW ON DISK. Indeed, some of them can barely scratch up the price of a subscription. That's why some people choose the Color Computer in the first place . . . it's cheap! The fact that it's also a remarkable computer is a nice bonus.

Three-column listings? Well, what would they look like? I don't know much about magazine format, so all I can say is "try it and see." I'm sure if it's not acceptable to your subscribers you'll hear about it in a hurry!

The only thing that's missing is more technical information on the CoCo 3.

John Murvine
Ebensburg, PA

Rest assured that we have no intention, whatsoever, of eliminating printed listings.

Regarding three column listings: Refer to pages 83 and 154 of last month's issue. To determine whether or not this format is acceptable to readers, we're anxiously awaiting feedback.

11 Out of 12 Ain't Bad

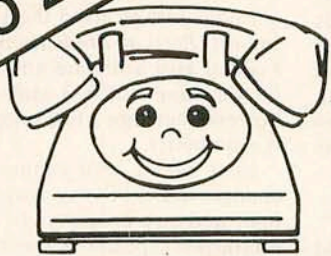
Editor:

In response to your request in the September 1987 "Building a Rainbow": Some things I really like are having the full address together in "Letters to Rainbow," pictures of screens in the reviews, the new design of the reviews section and the new typeface for programs (they're a lot easier to read now).

As far as the topics, I find all of them helpful except for the Business and Finance issue. I expect this to change, however, as I get older (I'm 16½).

I would whole-heartedly like three-column listings if it means more CoCo 3 articles, as there aren't too many right now. Dealing with this, I would not like you skipping listings in THE RAINBOW. If you did

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this, you would require most of us to get RAINBOW ON TAPE or RAINBOW ON DISK, which would really add to the cost of the magazine. I also feel that this would decrease the learning experience of THE RAINBOW.

*Will C. Power
Cotopaxi, CO*

Some CoCo Thoughts

Editor:

Being an amateur radio buff, I take an active role in its direction in order to keep its quality and enjoyment at a maximum. So when you asked to hear from your readers I jumped at my letter pad and started to scratch out my comments, which follow:

I subscribed to RAINBOW magazine from its beginning to help get it going and for the great magazine it was. About 14 months ago I let my subscription run out because the price of the subscription rose too fast for me and because of the dedicated issue format i.e., games, education, utilities, etc. At least six issues a year were of no interest to me. So I had six RAINBOWS that I never had any use for — accounting for half of my subscription. That means the remaining six issues cost me twice as much, theoretically \$5 per issue. I make this point not in bitterness, but in disappointment.

Like all CoCo nuts, though, I re-enlisted and joined the ranks again after I purchased one of the new CoCo 3s and received a free copy of RAINBOW magazine and realized how much I missed it.

I applaud Jutta Kapfhammer in her new position. Knowing that RAINBOW is now the

only magazine left for the Color Computer, she still wants feedback to improve RAINBOW for its subscribers.

I would like to see three-column listings of programs, also a greater variety of programs per issue. Some communications programs (not telecommunications) so the amateur population would start using the CoCo for communications instead of the very limited C-64.

I use my computers for several reasons. I use my IBM for writing several newsletters for local clubs and word processing for local legal researchers. My CoCo is used to keep track of statistics for a local softball league and experimental transmissions on the amateur radio bands (not Packet Radio).

*Richard T. Meuse
Melrose, MA*

Disk Dissertation

Editor:

I have a suggestion for an article that should be of interest to all computer users. The article would be on the care, handling and use of computer disks. Somewhere along the line most of us have seen and digested the knowledge that magnets and cat hairs are not good for disks. For most of us, the instructions end there.

For example, what is the best way to send disks through the mail? RAINBOW uses a thin piece of ordinary styrofoam as a backing. Some commercial programs come in very nice flat vinyl boxes. Is this of value or only to impress the buyer? I have a Canadian friend who wraps his disk in aluminum foil

and then a heavy envelope. Two others send disks in ZIP-lock sandwich bags with cardboard as a stiffener. All write "Do not X-ray" on the envelope. Is this because of a magnetic field around the equipment, or is the X-ray itself harmful to disks? Are the mail sorting and ZIP code reading equipment harmful to disks?

What about general storage of disks? Phonograph records are supposed to be kept in a vertical position. Is this true for disks, or can they be stored flat without harm? Is high humidity harmful? Does low humidity and the accompanying static electricity bother disks, or just computers? And, as part of this query, should you ground yourself before handling disks?

Music tapes are supposed to be played at least once a year to lessen the chance of print through. Is there a similar hazard for disks, and should we follow a similar procedure for all our disks? What about the blank disks you buy? I've bought them for 29 cents each in bulk and at \$2.50 for a single in a box. I've had no trouble with either. Is one really better than the other?

This is just a sampling of questions. Someone who has the answers or who can do the research could write a very important and interesting article.

*Page R. Edmondson
New Brighton, MN*

An excellent idea, indeed! Your questions are presently being researched and will be answered in a detailed article scheduled to appear in an early 1988 issue.

BACK TALK

Barden's Blunder?

As a programmer with experience on computers ranging from the TRS-80 Model I to Cray supercomputers plus a variety of languages, I was concerned about the attitudes expressed in William Barden's column "Learning the Lingo" (August, 1987, Page 168). There are three specific assertions of his that I take issue with.

The first is his statement that assembly language is "always the language of choice" for commercial applications. The facts are that this is true only on small microcomputers such as the CoCo 1 and 2. The relative ease of working in higher level languages means that on larger micros, including the Macintosh, IBM PC and the Atari ST, most applications are being written in C and PASCAL. Assembly language is only important where either code size or speed is a priority. With the CoCo 3's enhanced memory, I would expect to see more and more commercial applications written in C, taking advantage of Microware's excellent C compiler.

Second, I take issue with the implication that people should learn one computer language that "suits" them. There is a lot to be learned from any computer language, and my personal conviction is that a person should learn many computer languages, and choose the one best suited for each individual application. Even such relatively esoteric languages such as LISP and FORTH (both of which are available for the Color Computer) teach many important programming ideas, and can be very appropriate for certain tasks.

Finally, I quickly tired of his constant complaining about the lack of systems of the same calibre as *Turbo Pascal* on the Color Computer 3. He should take a closer look at BASIC09. Except for the lack of a full-screen editor, BASIC09 is such a system as he seems to want: it is interactive, has a fast compiler, and is a very complete language. Admittedly, BASIC09 is the only such system available for the Color Computer right now, but he apparently does not remember just how long it was before systems comparable to *Turbo Pascal* were available for BASIC and C on the MS-DOS systems. With the introduction of the Color Computer 3, we now have a first-class computer. It will take time before developers can tap the full potential of this machine.

Tim Koonce
Berkeley, CA

Smile When You Say That

Editor:

I would like to comment on Jay Thomas' letter in Doctor ASCII (July, 1987). I have been a proud owner of a CoCo 2 since 1982, and a CoCo 3 system for six months, and I have been working with different computer systems for six years. Well, Jay, I read that you loved your Atari system and felt that neither the CoCo 2 nor the CoCo 3 are comparable with your Atari XL. I have no

idea about which XL system you have, but I wonder if you ever read about the Atari 1200 XL, which was incompatible with itself and finally was killed. If those are the kinds of products that we can expect from Atari Corporation, you are giving very bad advice. Another thing: if you consider the CoCo to be less than "your supercomputer," why do you have it? I have never heard about any "supercomputer" made by Atari.

You said also that the new CoCo 3 is "extremely touchy and is filled with 'bugs'"; I think that you must be a pretty good technician and programmer to know about all of them. You gave a nice list of "bugs" that you have with your CoCo 3. Maybe the problems with the CoCo 3 aren't a "bunch of bugs" but a "bunch of user's mistakes"; my CoCo 3 is all I want in an inexpensive and flexible programmable machine. Again my question: Why do you have your CoCos? Yes, it's a really neat idea to sell them — maybe they are going to appreciative hands and you could then buy your 1040ST.

The CoCos have been in the market since the late 70's, and you are right to say that they don't compete with your Atari XL or ST, because the CoCos are better and still strong and alive. Better software and hardware is developed each day (you know that because you're reading THE RAINBOW).

The last thing I want to share with you is this: if you don't like the stuff, don't use it, as simple as that. I invite you to contact me when you want to sell your CoCo hardware/software. I don't refuse great products.

Carlos M. Santiago
Mayagrig, Puerto Rico

HINTS AND TIPS

Editor:

Without a doubt, Tudor Jones' *Solitaire* program (December 1986, Page 76) is outstanding among the games published by RAINBOW. I noted the suggestions published in the March issue, but I like the letters versus the symbols for easier recognition.

I made a small change, or rather an addition, to the program. It seemed to me that just the "you win" was not enough when winning. Consequently, I added a short musical passage to supplement the "you win" notice. The changes and additions are as follows:

Line 300: Delete the :GOSUB20:GOTO190 and then insert it at the end of a new Line 305:

```
305 PLAY~L803T2V 31;4;5;8;10;
    L4;04;1;03;12;10;9;8;9;
    L2T2;10;L4T2;8;9;10;11;
    L2T2;12;12;L404;1;03;12;
    10;9;8;9;L2T2;10;L4T2;8;
    9;10;12;L204T2;1~:GOSUB
    20:GOTO 190
```

Any other music could be used in place of the short passage I selected. I chose part of *Alley Cat* largely because it was different.

W. Tudor Morris
Middletown, OH

Poking the Pork

Editor:

I have just received the 1987 disk update for the *Pigskin Predictions* program from Federal Hill Software and it runs just fine on the new CoCo 3 and CM-8 monitor, however here are a few suggestions to make it even better.

First of all, you cannot make any big changes to the existing program or it will not load and run properly. To get around this limitation, type in this short loader program and save it to your working disk. It will give you your customized printer poke and change the graphics to your liking. I call mine PIGS.

```
10 POKE 150,1 'my system works just
   fine at 9600 baud
20 PALETTE5,0 'changes the light
   blueish color on the main menu
   screen to black
30 PALETTE9,38 'changes the main
   work area screen from green to
   BRONCO orange
40 PALETTE8,9 'changes the main
   work area text from black to
   BRONCO blue
50 RUN"PIGSPRED"
```

Using Page 297 in the CoCo 3 manual as a guide, you can change palette slots 8 and 9 to have your text look like your favorite team's colors. Good luck.

Greg Dorsha
Williston, ND

I/O Fixits

Editor:

In the August 1986 issue, Josh Alkire of Toledo, Ohio, mentioned his I/O problems on long programs. While I still experience this problem from time to time, I have minimized it through the following:

1. Replacing the cassette jacks with a four-pin terminal lug. Soldering the cassette wires to these terminals, then removing the plugs on the cable and screwing them directly to the corresponding terminal.

2. Replacing the cassette's drive belt whenever the occurrence of the I/O errors becomes too frequent.

3. Connecting a toggle switch to shunt the cassette's remote switch wires. With this switch, rewinding or fast forwarding of tapes can be done without unplugging the DIN plug. On tapes which display frequent I/O errors, I usually turn this switch to shunt, press the play button and keep typing CLOAD on the keyboard.

Most of the time it works. I usually make a minimum of four sets per program depending on the importance and length of my program.

Ernesto N. Mania
Manila, Philippines

Ask the "Dummies"

Editor:

When writing long BASIC programs that use several subroutines, you may lose track of where these routines are located if you renumber your program. Try this trick to find where the routines can be found. Place

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global search and replace (with wild-card search); line positioning (left, right or center); insert/overstrike modes; delete to beginning/end of line, next/previous word; and tabs. You can also embed printer codes in text to take advantage of underlining, sub/superscript and other printer functions. Define left, right, top and bottom margins, and page length.

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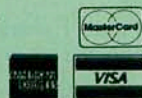
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"dummy" lines at the very end of your program to call these subroutines, placing a REM (or ') after the line number for the routine, plus a description of what routine is being called. No matter how many times you renumber your program, these lines will always tell you where your subroutines are.

Another bit of interesting information is that 63999 is the highest line number you can use in BASIC on a CoCo.

*Gay Crawford
Olathe, KS*

KUDOS

Editor:

I wish to thank THE RAINBOW and your free-lance writers for the help they bring us by giving hints and tips on programming.

A special thanks to Joseph Kolar, Fred Scerbo, Bill Bernico and all the others who contribute to a wonderful magazine.

About two years ago, I bought a 16K CoCo 2, which I thought was only to play games with (until I discovered THE RAINBOW). Then I realized I had a powerful machine in my possession.

Long live RAINBOW. Keep up the good work.

*Ernie DiZazzo
Montreal, Quebec*

Gimme Gimme Gimmesoft

Editor:

I would just like to take the time to tell you about the excellent service that I received from a company that advertises in THE RAINBOW. I ordered a 512K card from Gimmesoft via Delphi, and I received it in only three days. The documentation with it was excellent and the upgrade works perfectly. The software included with the upgrade is self-explanatory. I would recommend this product and company to everyone looking to upgrade their CoCo 3. Keep up the good work!

*William Dodge
(WIZARDRY)
Long Beach, NY*

PEN PALS

● I am 12 years old. I have a CoCo 3, FD 501 disk drive, DMP-105 printer and DCM-6 modem. I am looking for pen pals from the United States and Canada.

*Al Mendelson
3747 W. Devon
Chicago, IL 60659*

● I am a CoCo 3 user with hard drive, CGP-220, OS-9 Level II, and I play music with MIDI synthesizers. I am looking for an American pen pal. I am 27 years old and work in a bank.

*Alexandre Maggioni
Montoie 2
1007 Lausanne
Switzerland*

● I am 11 years old and looking for a pen pal that lives in California. He or she must

like science and be between the ages of 11 and 12.

I have a CoCo 3, FD 501 disk drive, RGB monitor and several other accessories.

*Tim Hennon
9539 Prairie Ave. #7
Highland, IN 46322*

● Anyone under 21 anywhere who wants a pen pal, please write. I have a CoCo 2 plus a CCR-81 recorder and many games and joysticks. I also love to do music programs on the CoCo. I will answer all letters.

*Norman L. Morris, Jr.
7632 S. Shore #2A
Chicago, IL 60649*

● For every CoCoist who enjoys playing all types of video games: I am planning on publishing a disk of assorted games-related material which you can be a part of! Write to me to talk about our games and maybe write a game for the rest of the world to see. Let's all become one big CoCo games pen pal club!

*Byron Fast
Box 151
Kleefeld, Man.,
Canada R0A 0V0*

● I am 14 years old and have a CoCo 2 and 3, two disk drives, Multi-Pak, 300-2400 baud modem, RGB monitor, Speech/Sound Pak, Orchestra-90 and Gemini 10X printer. I am looking for a pen pal from anywhere, especially Yugoslavia.

*Robert J. Liveoak
768 S. Dumfries
Detroit, MI 48217*

● I am 13 years old and have a 64K ECB CoCo 2, disk drive and DMP-106 printer. I'm looking for a 16-year-old or under pen pal with a similar system.

*Mike Kohut
RR 1
Lynden, Ontario
Canada L0R 1T0*

● I am 16 years old and I like Adventure games and programming BASIC. I have a dual disk drive, a DMP-105 printer and the CGP plotter. I hope to be getting a modem, and I will answer all replies.

*Patrick Cormier
415 Fourth Street
Petrolia, Ontario
Canada*

● I am 28 years old, have a CoCo 2, DMP-105 printer, three drives, CCR-81 cassette and modem and I would like to have pen pals from anywhere in the world.

*Dennis Gray
3643 S. 6885 W.
West Valley City, UT 84120*

● I am looking for pen pals all over the world. I am 16 years old and I love Adventures and arcade games. I am also interested in BASIC, assembly programming and electronics.

*Tal Pery
Harakefet 3 Street
Kiron, Israel 55408*

● I am starting an international computer pen pal club. Anyone who is interested in joining, please write.

*Heather Kingsley
603-2770 Aquitaine Ave.
Mississauga, Ontario
Canada L5N 3K5*

● I am 15 years old, own a CoCo 3, CoCo 2, Speech/Sound Pak, cassette recorder and a pair of joysticks. I am looking for pen pals all over the world and am hoping to hear from all you CoCo Canadians.

*Randy J. Pekar
Group Box 7, Site I
Yorkton, Saskatchewan
Canada S3N 2V6*

● I am 10 years old and would like a pen pal within a year's range of my age. I have a CoCo 2 (64K), two joysticks, FD-500 disk drive and Panasonic cassette recorder. I have solved *Bedlam*, *Hall of the King*, *The Maze of Moycullen*, and *Success Mansion*. I love "Star Trek." If you want a pen pal, please write me. I'll answer all letters.

*Spencer Metcalf
109 Janet Street
Longview, TX 75601*

● I would very much like to correspond with any and all CoCo owners everywhere. I feel I'm all alone with my 64K CoCo 2, one disk drive, cassette and DMP-105 printer. I enjoy all types of programs — utilities, Adventures, games, etc. Please write, and dispel these lonely feelings.

*Kimberly K. Lindquist
3250 NW Ridgeview Lane
Albany, OR 97321*

● I am 13 years old and have a 64K CoCo 2, disk drive, DMP-100 and a joystick. I like all games and will reply to all responses.

*Donald G. Hitt
1046 Meadowbrook
Corpus Christi, TX 78412*

● I have a 64K CoCo 2 with Extended BASIC, a cassette recorder and joysticks. I will try to answer all replies but would prefer a pen pal from Africa or Asia.

*David Smith
Rt. 1 Box 50
Texico, IL 62889*

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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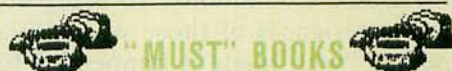
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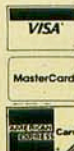
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Got "one for the book"?

Lonnie asked me to sit in for him this month and tell you about the book I'm working on, a history of the Color Computer. Our feeling is that the more people who are aware of this project, the more material will be available and the broader-based and better the book can be. Yet, while casual mention has been made of the book on Delphi, and while I did make several references to it at the CoCo Community Breakfast and at some seminars at our very successful October 9, 10 and 11 Princeton RAINBOWfest, a slice of CoCo history in itself, I believe this is the first time we've mentioned it in *THE RAINBOW*.

I see the book as very people-oriented, though, of course, the significant hardware and software developments, the milestones, naturally must be noted. The emphasis, though, should be on the people who are a part of the CoCo Community. To bring life to any subject, you relate it through the experiences of those whose lives are intertwined in that activity, the people "who made it happen." Through our many RAINBOWfests, we have had the opportunity to get to know some of the "movers and the shakers" of our CoCo Community. Others we know only by telephone, or Delphi, or perhaps a letter or two.

If this book is to have the breadth and scope we have in mind, though, we must have your help. You see, the city limits of our CoCo Community extend well beyond Prospect, Kentucky, and the various RAINBOWfest sites. Yes, though concentrated in the United States and Canada, ours is a global community and English is merely our primary language. Did you ever see one of the Australian editions of *THE RAINBOW*? Have you ever read a RAINBOW article reprinted in Hungarian? Did you know that there is an edition of *The Complete Rainbow Guide to OS-9* printed in Japanese?

No, the CoCo is not taking over the world, but while we like to think that Prospect and Fort Worth are focal points of CoCo activity, wouldn't it be fun to be able to peek into Tony DiStefano's Canadian workshop, Marty Goodman's California parts drawer, the back room at Speech Systems in Batavia, Illinois, or the monthly Cajun CoCo Club meeting down in Crowley, Louisiana? Club pictures! Wouldn't it be a gas to have group shots of all the CoCo clubs? Did you know there's a club in Beverly Hills as well as South Sioux City, Nebraska? In Hardburly, Kentucky, and Hamburg, West Germany. In Salt Lake City, but also in Hobart, Tasmania. In seven provinces of Canada, and even the Netherlands and Mexico. You'd figure on one in East Peoria, but how about Netanya, Israel!

Wouldn't it be terrific if pictures and capsule reports and anecdotal material for the CoCo history book poured in from all points of the CoCo Community? Can it be that the same avid interest that brings them out

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for Cincinnati's CINTUG meetings is also the driving force for CoCo Club activities in the coastal town of Piura, Peru, in the shadow of the Andes Mountains? I wonder how Dale Puckett's computer setup in Rockville, Maryland, compares with David Ardila's in Bogota, Colombia.

Have you helped make CoCo history? Want to be in the book? Well, then, take pen (or word processor) in hand and tell us about it. Have you seen a computer setup that just begs to be photographed? Do you know where Captain 80 is now? Perhaps you know a story about Jake Commander. Maybe you have pictures of the editorial offices of Color Computer Magazine, or a shot of the lab at Frank Hogg Laboratory. How about the loading dock at Computer Plus, or the boat dock (?) at Computer Island? I took some shots in the old Fort Worth CoCo factory; maybe you have some pictures of Tandy's present CoCo plant in Korea.

I have visited Dr. Preble and his wife, Dr. Preble, at Dr. Preble's Programs (I think it should be Drs. Preble Programs); maybe you've visited Doctor ASCII or Dr. Plog or Dr. Goodman. Wouldn't it be fun to see photos of the authors of such programs as *Madam Rosa's Massage Parlor*, *Mega-Bug*, *Black Sanctum*, *Telewriter*, *Dungeon Quest*, or even *Star-DOS*? And, you know there are many stories connected with the development of all the CoCo Classics. Wonder where Tom Mix hangs his ten-gallon hat? You may be the one to fill us in on where the HOT CoCo

people are now. Maybe you can report a "first."

History books are full of firsts. For instance, Lee Veal, of Rowlett, Texas, has the first CoCo: Serial #000001, a 4K, nonextended, with a "C" Board. Yes, it works fine. In fact, he just got it a year ago on an "as-is" table in a Fort Worth Radio Shack. Ron Krebs of Mark Data lays claim to having created and marketed the first Color Computer Adventure game, *Calixto Island*. He and his wife wrote it and got the name from a street in their neighborhood in Mission Viejo, California. Dave Lagerquist, who founded *Chromasette* Magazine, appears to be the first to use the term "CoCo" in a publication. Wayne Green was the first to predict the imminent demise of the CoCo — almost six years ago in the January 1982 issue of *80 Microcomputing*! Maybe you know of some firsts we haven't heard about.

Funny stories. Anecdotes. Everybody loves those short, entertaining accounts of personal experience. Does a CoCo club meeting go by without someone telling a CoCo "war story" or two? I'd like to include some of the best anecdotes, with credit lines, in little box inserts scattered throughout the book. And a history book comes alive with pictures of people! Maybe you have a lulu and its publication was "just meant to be."

Yes, we have heard our share of tales, but I'm sure there are some jewels out there just crying to be told. Sometimes a simple phone call yields a memorable story. Other times, a reader with a sense

of humor will write in to share a "boner." One of my favorite letters to the editor was from a reader who recalled someone writing in RAINBOW that nothing entered through the keyboard would ever damage the computer. He said he accepted that until he "entered a full glass of lemonade through the keyboard and it *did* cause problems."

Father Bill Fleener, the Old Father William of Color Computer News, has a funny story about him and his wife deciding to sell the family piano in order to buy a Color Computer. Peter Stark likes to tell about having to change the name of his Star-Kits company, "because everyone kept asking for Charlie the Tuna!" Dan Downard has a new story every time he drops by my office. A few of his are about me, but I have some doozies about him, as well. We both have "Lonnie stories" to throw in the pot. Our CoCo history book is a case in which the more cooks, the better the broth.

If the foregoing has not reminded you of some quotable quote or personal glimpse into your own CoCo experience, maybe you'll just have to wait for the book to come out, but if there's a stir in your memory, a recollection of a cute story of life and people in our CoCo Community, a snapshot stuck away in a drawer, a personal perspective on significant CoCo turning points such as events in the development of new products and publications, then I invite you to help me write the book!

— Jim Reed

```

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One-Liner Contest Winner . . .

Here is a quick and easy method of achieving a PCLEAR0 on your Color Computer. If you have Extended BASIC 1.0 or any problem with the PCLEAR1 used in the program, you will need to set it up as follows:

```

10 GOTO 63000
20 start your program here
:
:
63000 insert PCLEAR0 routine here followed by
      GOTO 20

```

The listing:

```

10 POKE182,0:POKE183,PEEK(188):P
OKE184,0:POKE185,16:POKE186,PEEK
(188):POKE187,0:POKE188,PEEK(188
-6):PCLEAR1:POKE183,PEEK(183+6):
POKE188,PEEK(188+6)

```

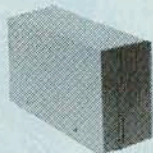
Vernon Nemitz
Virginia Beach, VA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

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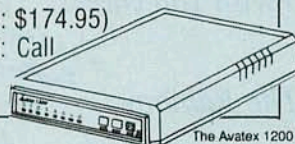


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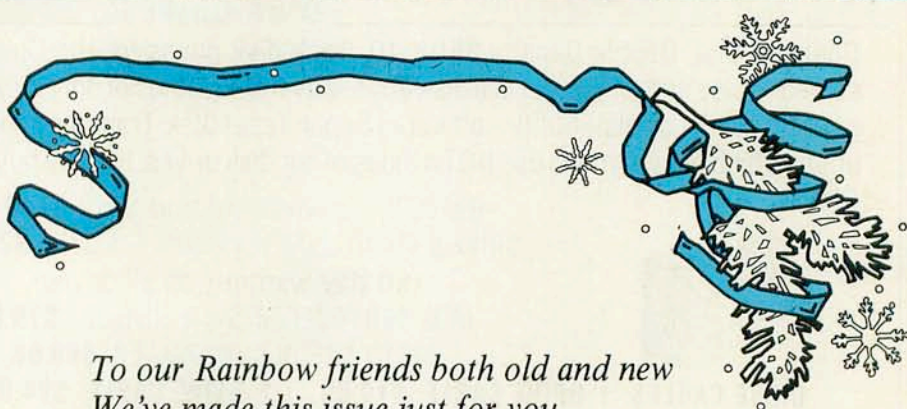
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See pg.138 10/87
Rainbow review

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CoCo Gallery



Mill

John Murvine



John, of Ebensburg, Pennsylvania, used a utility he wrote to enrich the gallery with this winter scene portraying the Wayside Inn Grist Mill located in South Sudbury, Massachusetts.

Honorable Mention



Santa

Claire Beaupre

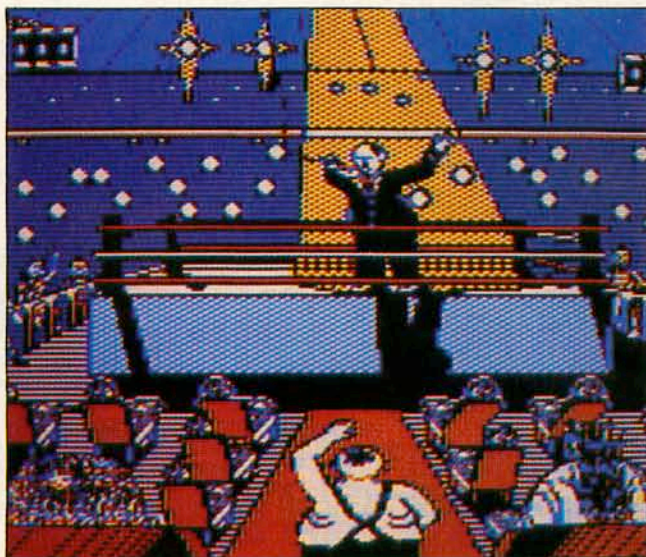
Color Designer and CoCo Max were used to create this seasonal representation of the famous man. Claire is a laboratory technologist of clinical chemistry in Montreal, Quebec.



Blue Angels

John Owens

John was inspired to produce this artwork when he saw the famous Blue Angels perform in Rome, New York. He used Color Max 3.



Wrestle

Barry O'Brien



This detailed illustration of the moments before a wrestling match was produced with *CoCo Max*. Barry lives and attends school in St. John's, Newfoundland. He enjoys drawing on his Color Computer.



This image of a single engine airplane flying in the mountains was generated with *Color Max 3*. Brad is a sophomore in high school and lives in Wyomissing, Pennsylvania.

Airplane

Brad Bansner

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of \$25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of \$15 and one third prize of \$10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator



Where are the toys?

A Christmas Dream

By Lonni Wilson



Something wakes you in the middle of the night on Christmas Eve, and you sleepily go downstairs to the Christmas tree to look for toys. But there aren't any!

"Didn't Santa come?" you tearfully ask.

A strange voice answers, "Yes, but you won't get your toys."

You catch a glimpse of someone running downstairs and you follow him. He runs behind some crates and escapes through a secret door, which you had no idea existed.

"I must find the toys," you say to yourself (remembering you had requested a multipack from Santa) as you follow the stranger down to a glittering, secret place. "I know I've been good."

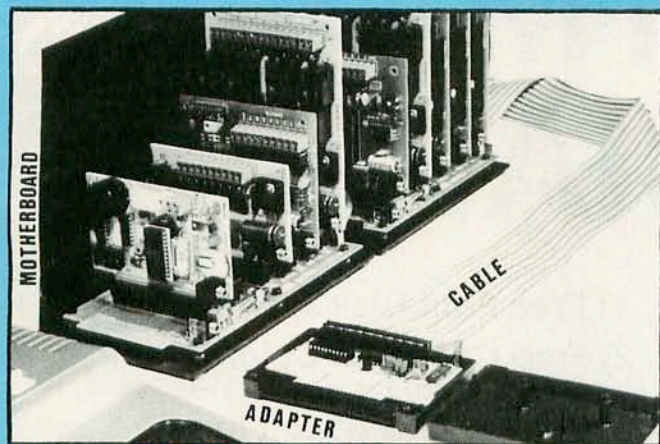
You must find the toys in this secret world. But enjoy yourself, and remember anything is possible — this is a magic place!

(Questions may be directed to the author at 2351 C' Dale Drive, Harrison, MI 48625. Please enclose an SASE when writing for a reply.) ☐

Lonni Wilson is a Harrison, Michigan CoCoist who dislikes spending "tedious hours of typing" to key in a program.

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An A-BUS system with two Motherboards
A-BUS adapter in foreground

The A-BUS system works with the original CoCo,
the CoCo 2 and the CoCo 3.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card

RE-140: \$129

Includes eight industrial relays. (3 amp contacts. SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card

RE-156: \$99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card

AD-142: \$129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter

AN-146: \$139

This analog to digital converter is accurate to .025%. Input range is -4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card

IN-141: \$59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O

DG-148: \$65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional I/O. Uses the 8255A chip.

Clock with Alarm

CL-144: \$89

Powerful clock/calendar with battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder

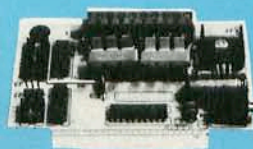
PH-145: \$79

Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card

PR-152: \$15

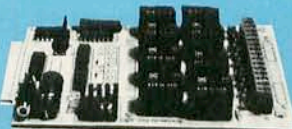
3 1/2 by 4 1/2 in. with power and ground bus. Fits up to 10 I.C.s



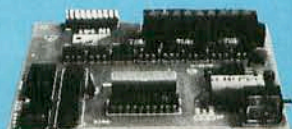
ST-143



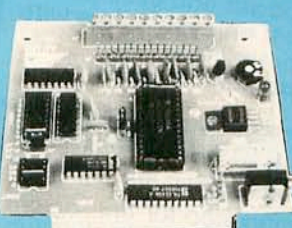
CL-144



RE-140



IN-141



AD-142

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for \$10.

Smart Stepper Controller SC-149: \$299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: \$49

To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: \$89

Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: \$19

For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: \$79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

Special Package: 2 motors (MO-103) + ST-143: PA-181: \$99

Stepper Motors MO-103: \$15 or 4 for \$39

Pancake type, 2 1/4" dia, 1/8" shaft, 7.5"/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...\$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...\$69
Apple II, II+, IIe. Uses any slot.	AR-134...\$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus"	AR-136...\$69
Model 100. Uses 40 pin socket (Socket is duplicated on adapter)	AR-135...\$69
TRS-80 Mod 3, 4, 4D. Fits 50 pin bus (With hard disk use Y-cable)	AR-132...\$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed)	AR-137...\$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...\$39
Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable.	AR-138...\$49

A-BUS Cable (3 ft, 50 cond.)

CA-163: \$24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

Special cable for two A-BUS cards: CA-162: \$34

A-BUS Motherboard

MB-120: \$99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: \$12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

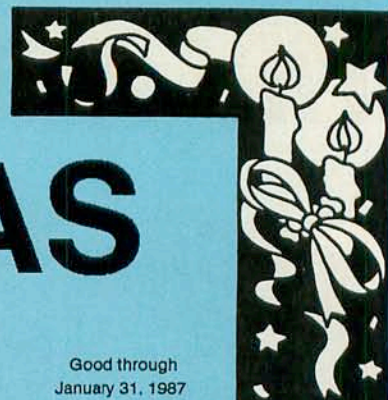
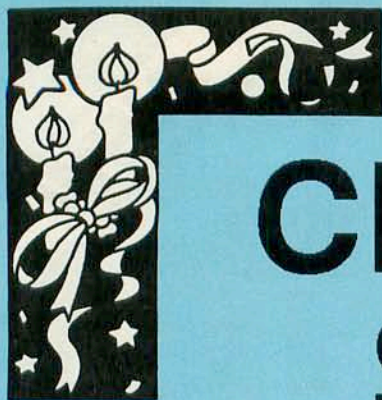
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When you order CoCo Max III. Only \$79.95 including the deluxe hi-res interface.



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A FEW QUOTES :

An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
- **Family Computing**

There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
- **Computerware Review**

In Everyone's book, CoCo Max is rated again and again as the most incredible product ever marketed for the CoCo.
- **CoCo America Club**

I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
- **6809 Express**

Note: There is only one CoCo Max III. Do not confuse **COLORWARE**'s CoCo Max with similar sounding imitations.

INTRODUCING THE NEXT GENERATION:

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More Resolution

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More Color

Built-in Animation

More Speed

More Type Styles

More Tools

Amazing Color Sequencing

"The best program ever written for the Color Computer"

That's how thousands of enthusiastic users rated the CoCo Max II drawing program. With CoCo Max III we are ready to amaze them again. Instead of "patching" CoCo Max II, we rewrote it from scratch to take advantage of the CoCo Max III hardware. The results will knock your socks off! Below is a brief list of some of the *new* features, but some, such as **animation**, **color sequencing**, or the **slide show**, have to be seen. Send for the Demo Disk, and see for yourself.

Everybody's favorite drawing package features:

- A 50% larger editing window.
- Zoom area 400% larger.
- New drawing tools: **rays**, **3D cubes**, **arcs**,...
- New editing tools: shadow, text size,...
- Rotate by 1.5° steps
- Select any 16 of the 64 possible colors (all 64 colors displayed at once!)
- Powerful **color mix**: additive, subtractive, overlay,...
- Full **color editing** of patterns and color changing patterns.
- Incredible **special effects** with **color cycling** up to 8 colors with variable speed.
- **Animation** adds the dimension of motion to your image. (Must be seen.)
- Sophisticated data compression saves up to 70% of disk space when saving pictures.

In addition, there are dozens of enhancements to the multitude of features that made CoCo Max II a best seller.

More about CoCo Max III

- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
- The new CoCo Max III **Hi-Res Interface** and the CoCo Max II **Hi-Res Pack** are *not* interchangeable.
- The new interface plugs into the joystick connector.
- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures.

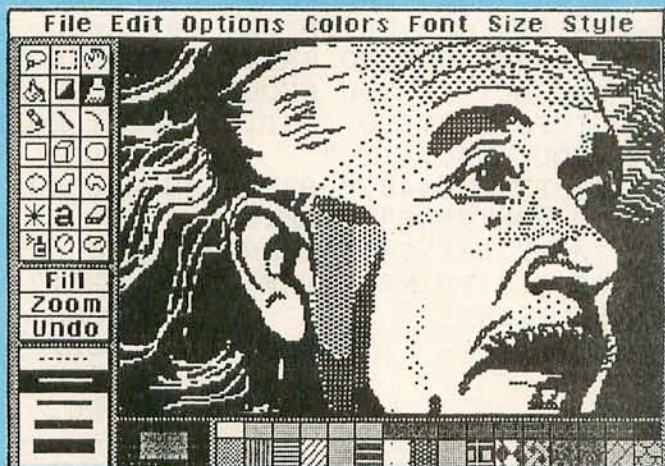
Note: CoCo Max II (for the CoCo 2) is still available on disk (\$79.95). CoCo Max I is still available on tape (\$69.95). For details, refer to our double page ad in any *Rainbow* from January '86 to July '87

Toll Free operators are for orders only. If you need precise answers, call the **tech line**. (Detailed CoCo Max specs are included with the Demo Disk.)

Add \$3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
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* Beware of inferior imitations that **DO NOT** include a Hi-Res Interface or charge extra for each utility.



Imagine this picture in sixteen colors!

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Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

System Requirements:

Any CoCo 3 disk system with a Joystick or a Mouse.

We apologize to tape users, CoCo Max III needs the flexibility of a disk.

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The listing: DREAM

```

Ø CLS:PRINT" IN THIS ADVENTURE,
YOU MUST FIND THE STOLEN CHRI
STMAS TOYS, WHICH ARE HIDDEN IN
A MAGIC WORLD, AND RETURN TH
EM TO YOUR HOUSE."
1Ø PRINT:PRINT:PRINT" THIS ADVE
NTURE USES TWO WORD COMMANDS SU
CH AS, get knife OR say help. T
HE GAME HAS NO SAVE/ LOAD FUNCTI
ON, BUT IF YOU SHOULDPRESS BREAK
TYPE CONT TO CONTIN-UE. I HOPE
YOU ENJOY IT."
2Ø PRINT@448," PRESS <SPACEBAR>
TO CONTINUE";INKEY$
3Ø IFINKEY$=" "THEN4ØELSE3Ø
4Ø CLS:PRINT" THE VERBS ARE:"
5Ø PRINT"
ASK
GET
DROP
PUT

```

6Ø PRINT"

```

PRINT@448," PRESS <SPACEBAR> TO
CONTINUE";INKEY$
7Ø IFINKEY$=" "THEN8ØELSE7Ø
8Ø CLS
9Ø DIM A$(8),B$(8),C$(8):L=1
1ØØ DATA IN THE ENTRANCE TO THIS
ENCHANTING WORLD,MAGIC KNIFE,WE
ST
11Ø DATA IN THE UPSIDE DOWN
FOREST,UPSIDE DOWN TREES,NORTH
EAST
12Ø DATA IN A COURTYARD,A BEAUTI
FUL FOUNTAIN,NORTH NORTHEAST
SOUTH WEST
13Ø DATA AT A POND,PINK WATER,SO
UTHWEST
14Ø DATA IN FRONT OF A LARGE
STONE,STONE,SOUTH
15Ø DATA IN A FRUIT ORCHARD,FRUI
T,NORTH EAST
16Ø DATA IN FRONT OF AN ELF,ELF,
SOUTH
17Ø DATA IN A SMALL SHACK,GIFTS,

```

USE
EAT
SAY"
LOOK
PULL":

Corrections

"Gift Buyer's Guide" (November 1987, Page 57): The price for Spectrum Projects' CoCo Keyboard Extender Cable was incorrectly stated as being \$19.95. The actual price is \$39.95.

"A Desktop Publisher on a Shoestring" (October 1987, Page 58): Author H. Allen Curtis has written to indicate some minor errors in the article. First, in the rightmost column on Page 62, the user is told to "Change Line 35 to:". This should actually read "Insert Line 35" since that line did not already exist. Just below that, in the fifth line of Line 35, you should change TØ to TØ. Finally, in Line 205 of Listing 1, a value of &24 was given. This should read &H24. However, this doesn't have any effect on program execution.

"CoCoDraw Update" (October 1987, Page 98): In the rightmost column of Page 98, Line 11 is missing a parenthesis. In that line, just after the value of 50, should be two parentheses, so that section should read N/50)) instead of N/50).

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type DATA at the CoCo SIG> prompt and INFO at the TOPIC> prompt.

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Breaking your back
typing on your
CoCo???



Sit back and relax with
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extender cable. \$39.95
See 11/87 Rainbow review
page 137



Now you can extend your present keyboard away from your CoCoII/CoCoIII! Easier typing & requires no soldering! You also have the option to leave your present keyboard intact & hook up a second keybd for remote operation! Spectrum Keyboard extender cable w/EXTERNAL CoCoII keyboard\$49.95
Design by Marty Goodman, so you know it's quality!

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64K RAM CHIPS \$12.95


```

NOWHERE! use THE force LUKE!
180 FORI=1TO8
190 READ A$(I),B$(I),C$(I)
200 NEXT
210 PRINT"YOU ARE:";A$(I)
220 PRINT"YOU SEE:";B$(I)
230 PRINT"YOU CAN GO:";C$(I)
240 INPUT"WHAT DO YOU WISH FOR";
M$
250 ON I GOSUB 270,330,400,470,5
10,550,610,650
260 FORX=1TO1500:NEXTX:CLS:GOTO2
10
270 IFM$="GET KNIFE"THENPRINT"OK
AY, YOU HAVE IT.":KNIFE=1:B$(1)=
"A RAINBOW...THE RAINBOW"
280 IFM$="LOOK KNIFE"THENPRINT"I
T IS SHAPED WEIRD."
290 IFM$="GET RAINBOW"THENPRINT"
YOU HAVE IT.":B$(1)="LOTS OF INT
ERESTING THINGS."
300 IFM$="LOOK RAINBOW"THENPRINT
"IT IS MADE UP OF RAINBOW MAGA-
ZINES."
310 IFM$="W"THENL=2
320 RETURN
330 IFM$="LOOK TREES"THENPRINT"T
HE limbs ARE SHAPED FUNNY.":B$(2
)="UPSIDE DOWN TREES FUNNY limb
S"
340 IFM$="PULL LIMB"THENPRINT"YO
U HERE A NOISE IN THE DISTANCE":
LIMB=1
350 IFM$="LOOK LIMB"THENPRINT"IT
'S FUNNY, OKAY?"
360 IFM$="N"THENL=3
370 IFM$="E"THENL=1
380 IFKNIFE=2ANDLIMB=1ANDRAIN=1A
NDM$="SAY GIFT"THENL=8
390 RETURN
400 IFM$="LOOK FOUNTAIN"THENPRIN
T"THE WATER IS A RAINBOW OF COLO
RS"
410 IFM$="GET FOUNTAIN"THENPRINT

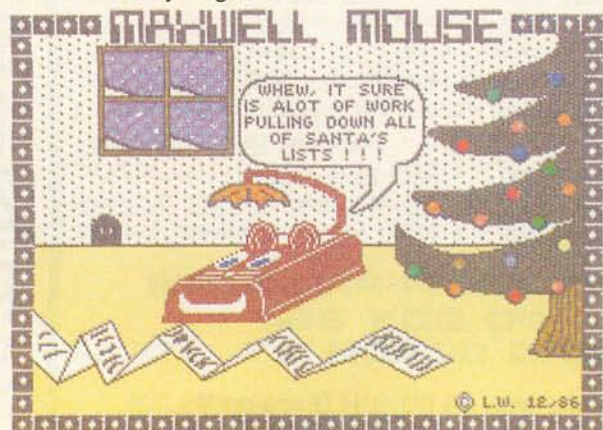
```

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"DON'T TAKE ALL THE BEAUTY AWAY.
"
420 IFM$="N"THENL=5
430 IFM$="NE"THENL=4
440 IFM$="W"THENL=6
450 IFM$="S"THENL=2
460 RETURN
470 IFM$="LOOK POND"THENPRINT"A
RAINBOW WOULD LOOK BEATIFUL HE
RE!"
480 IFM$="DROP RAINBOW"THENPRINT
"YOU HEAR ANOTHER SOUND IN THE
DISTANCE":RAIN=1:B$(4)="RAINBOW
OVER POND"
490 IFM$="SW"THENL=3
500 RETURN
510 IFM$="LOOK STONE"THENPRINT"T
HERE IS A SLOT IN IT."
520 IFM$="PUT KNIFE"ANDKNIFE=1TH
ENINPUT"WHERE";DD$:IFDD$="STONE"
THENPRINT"YOU HEAR A THIRD SOUND
IN THE DISTANCE!":KNIFE=2:B$(
5)="KNIFE IN STONE"
530 IFM$="S"THENL=3
540 RETURN
550 IFM$="LOOK ORCHARD"THENPRINT
"IT IS FILLED WITH FRUIT TREES."
560 IFM$="GET FRUIT"THENPRINT"OK
AY, YOU HAVE IT.":FRU=1
570 IFFRU=1ANDM$="EAT FRUIT"THEN
PRINT"THEN FRUIT POISONED YOU, B
ECAUSEYOU WERE NOT USED TO IT."
580 IFM$="N"THENL=7
590 IFM$="E"THENL=3
600 RETURN
610 IFM$="ASK ELF"THENPRINT"IF Y
E EQUALS THREE AND
SOUND IS AROUND THEN
SAY GIFT IN T
HE UPSIDE DOWN FOREST.":FORX=1TO
5000:NEXTX
620 IFM$="LOOK ELF"THENPRINT"HE
IS A CRISTMAS ELF."
630 IFM$="S"THENL=6
640 RETURN
650 IFM$="LOOK GIFTS"THENPRINT"T
HEY ARE THE STOLEN ONES."
660 IFM$="GET GIFTS"THENPRINT"YO
U HAVE THEM.":GF=1:B$(8)="LOTS O
F INTERESTING THINGS"
670 IFGF=1ANDM$="USE FORCE"THEN6
90
680 RETURN
690 CLS:PRINT" YOU DID IT! YOU
RETURNED THE GIFTS NOT ONLY TO
YOUR HOUSE BUTTO EVERY HOUSE. Y
OU MADE CHRISTMAS A REAL C
HRISTMAS!":END

```

Mouse Tales By Logan Ward



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A Festival of Lights

By Renard DellaFave

Hanukkah brings the brilliance of CoCo 3 graphics together with the Hanukkah festival of lights, and also demonstrates animation techniques for use on the CoCo 3.

Hanukkah draws a menorah, dradle, and a Star of David on the screen; the flame on the menorah flickers and the dradle spins and moves. For each tap of a key another flame is added to the menorah, in the traditional order of right-to-left.

Both the flame and the dradle are literally scanned onto the screen from DATA statements, which makes it very easy to modify their shapes. The flame, as it is animated by palette switching in Line 1380, is immediately saved into HGET buffer #1. The dradle images are first modified using HLINE statements to create the four frames that are used in its HGET/HPUT animation. Each HBUFFER is used before the next one is reserved, due to a bug in CoCo 3's BASIC.

After the dradle and flame have been drawn and put in HBUFFERS with the HGET command, the screen is cleared and the stationary objects are created. Both the menorah and the Star of David are drawn using HDRAW and HPAINT commands; the text is put on the screen with HPRINT. The center (shamas) and the rightmost flame are then put on the menorah with HPUT, and the main loop of the program is entered.

All the action takes place in the main loop. The flames are

flickered by exchanging the values of two palette slots, and the text is made to change color by changing the value of a single slot. The dradle is moved by HPUT to a different position each time, and spun by cycling through the four images created earlier. Line 1400 checks to see if a key has been pressed, and adds another flame if one has.



Hanukkah is heavily remarked, making it is easier to understand, but these remarks can safely be left out if you want.

(Questions about this program may be directed to the author by calling 919-787-8396.)

Renard DellaFave is a student living in Raleigh, North Carolina, and is a self-taught programmer. Besides computers, he enjoys electronics, books and science.


```

,0,0,0,0
310 DATA 0,0,0,0,6,6,3,3,3,5,5,0
,0,0,0,0
320 DATA 0,0,0,6,6,6,6,3,7,5,6,6
,0,0,0,0
330 DATA 0,0,0,6,6,6,3,7,7,5,6,6
,0,0,0,0
340 DATA 0,0,0,6,6,6,3,7,7,7,6,6
,0,0,0,0
350 DATA 0,0,6,6,6,7,7,7,7,7,6,6
,0,0,0,0
360 DATA 0,0,6,6,6,7,7,7,7,7,6,6
,0,0,0,0
370 DATA 0,0,6,6,6,7,7,7,7,7,7,6
,0,0,0,0
380 DATA 0,0,0,6,6,7,7,4,7,7,7,6
,0,0,0,0
390 DATA 0,0,0,6,7,7,7,4,4,7,6,6
,0,0,0,0
400 DATA 0,0,0,6,7,7,7,4,4,7,6,0
,0,0,0,0
410 DATA 0,0,0,6,6,7,7,4,4,7,6,0
,0,0,0,0
420 DATA 0,0,0,0,6,6,7,4,7,6,0,0
,0,0,0,0
430 REM SCAN FLAME IMAGE FROM DA
TA
440 FOR Y=0 TO 32 STEP 2:FOR X=0

```

```

TO 30 STEP 2
450 READ V:IF V=0 THEN HRESET(X,
Y):GOTO 480
460 C=V+5 'COMPUTE CORRECT COLOR
470 HSET(X/2,Y/2,C)
480 NEXT X,Y
490 REM STORE FLAME IN HBUFFER #
1
500 HGET (0,0)-(16,16),1
510 HCLS0
520 REM DRAW AND GET DRADLES
530 DATA 0,0,0,0,0,0,0,0,0,0,1,1
,0,0,0
540 DATA 0,0,0,0,0,0,0,0,0,0,1,1
,0,0,0
550 DATA 0,0,0,0,0,0,0,0,0,0,1,1,1
,0,0,0
560 DATA 0,0,0,0,0,0,0,0,0,0,1,1,0
,0,0,0
570 DATA 0,0,0,2,2,0,0,0,0,1,1,1,0
,0,0,0
580 DATA 0,0,0,2,2,2,2,0,1,1,0,0
,0,0,0
590 DATA 0,0,2,2,2,2,2,2,1,2,2,2
,0,0,0
600 DATA 0,0,2,2,2,2,2,2,2,2,2,2
,2,0,0
610 DATA 0,0,2,2,2,2,2,2,2,2,2,2
,2,0,0
620 DATA 0,0,2,2,2,2,2,2,2,2,2,2
,2,0,0
630 DATA 0,2,2,2,2,2,2,2,2,2,2,2
,2,0,0
640 DATA 0,2,2,2,2,2,2,2,2,2,2,2
,0,0,0
650 DATA 0,2,2,2,2,2,2,2,2,2,2,2
,0,0,0
660 DATA 2,2,2,2,2,2,2,2,2,2,2,2
,0,0,0
670 DATA 2,2,2,2,2,2,2,2,2,2,2,2
,0,0,0
680 DATA 2,2,2,2,2,2,2,2,2,2,2,0
,0,0,0
690 DATA 0,1,2,2,2,1,2,2,2,2,2,0
,0,0,0
700 DATA 0,0,1,1,1,1,1,2,2,2,0,0
,0,0,0
710 DATA 0,0,1,1,1,1,1,1,1,1,0,0
,0,0,0
720 DATA 0,0,0,1,1,1,1,1,1,0,0,0
,0,0,0
730 DATA 0,0,0,1,1,1,1,0,0,0,0,0
,0,0,0
740 DATA 0,0,0,0,1,0,0,0,0,0,0,0
,0,0,0
750 REM SCAN DATA FOR DRADLE TO
SCREEN
760 FOR Y=0 TO 21:FOR X=3 TO 17
770 READ V

```

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```

780 IF V=0 THEN GOTO 800 ELSE IF
V=1 THEN C=4 ELSE IF V=2 THEN C
=5
790 HSET(X,Y,C):HSET(X+40,Y,C):H
SET(X+80,Y,C):HSET(X+120,Y,C)
800 NEXT X,Y
810 REM SET UP "CORNERS" WITH HL
INES
820 HCOLOR 4
830 REM FRAME 0 CORNER LINES
840 HLINE(6,5)-(4,15),PSET
850 HLINE(7,5)-(4,15),PSET
860 HLINE(15,7)-(11,17),PSET
870 HLINE(15,8)-(12,17),PSET
880 REM FRAME 1 CORNER LINES
890 HLINE(8+40,5)-(5+40,15),PSET
900 HLINE(8+40,6)-(5+40,16),PSET
910 HLINE(9+40,6)-(6+40,16),PSET
920 HLINE(10+40,6)-(7+40,16),PSE
T
930 REM FRAME 2 CORNER LINES
940 HLINE(10+80,7)-(8+80,16),PSE
T
950 HLINE(11+80,7)-(9+80,16),PSE
T
960 HLINE(12+80,6)-(9+80,16),PSE
T
970 REM FRAME 3 CORNER LINES

```

```

980 HLINE(13+120,6)-(10+120,16),
PSET
990 HLINE(14+120,6)-(10+120,17),
PSET
1000 HLINE(14+120,7)-(11+120,17)
,PSET
1010 REM *"GET" DRADLE FRAMES IN
TO
1020 REM APPROPRIATE HBUFFER AR
EAS
1030 HBUFF 2,242
1040 HGET (0,0)-(20,21),2 'FR
AME 0
1050 HBUFF 3,242
1060 HGET (40,0)-(60,21),3 'FR
AME 1
1070 HBUFF 4,242
1080 HGET (80,0)-(100,21),4 'FR
AME 2
1090 HBUFF 5,242
1100 HGET (120,0)-(140,21),5 'FR
AME 3
1120 HCLS
1130 REM DRAW MENORAH
1140 HDRAW "C1;BM55,36;M62,36;M6
2,48;M69,48;M69,96;M76,96;M76,10
2;M90,102;M90,108;M132,108;M132,
96;M90,96;M90,90;M83,90;M83,36;M

```

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90,36;M90,78;M97,78;M97,84;M132,
84;M132,78;M111,78;M111,72;M104,
72;M104,36;M111,36;M111,60;M118,
60;M118,66"
1150 HDRAW "M132,66;M132,54;M125
,54;M125,36;M132,36;M132,48;M139
,48;M139,54;M146,54;M146,30;M160
,30;M160,54;M167,54;M167,48;M174
,48;M174,36;M181,36;M181,54;M174
,54;M174,66;M188,66;M188,60;M195
,60;M195,36;M202,36;M202,72;M195
,72;M195,78"
1160 HDRAW "M174,78;M174,84;M209
,84;M209,78;M216,78;M216,36;M223
,36;M223,90;M216,90;M216,96;M174
,96;M174,108;M216,108;M216,102;M
230,102;M230,96;M237,96;M237,48;
M244,48;M244,36;M251,36;M251,60;
M244,60;M244,108;M237,108;M237,1
14;M223,114"
1170 HDRAW "M223,120;M174,120;M1
74,138;M167,138;M167,144;M160,14
4;M160,156;M167,156;M167,168;M17
4,168;M174,174;M188,174;M188,180
;M209,180;M209,186;M216,186;M216
,192;M90,192;M90,186;M97,186;M97
,180;M118,180;M118,174;M132,174;
M132,168;M139,168"
1180 HDRAW "M139,156;M146,156;M1
46,144;M139,144;M139,138;M132,13
8;M132,120;M83,120;M83,114;M69,1
14;M69,108;M62,108;M62,60;M55,60
;M55,36"
1190 HPAINT (153,31),1,1
1195 REM "HAPPY HANUKKAH" MESSAG
E
1200 HCOLOR 7,0:HPRINT(13,0),"HA
PPY HANUKKAH"
1210 REM DRAW STAR OF DAVID
1220 HDRAW "C6;BM62,132;F42;L84;
E42;BM62,186;E42;L84;F42"
1230 REM CENTER
1240 HPAINT(62,162),3,6
1250 REM CORNERS
1260 HPAINT(62,138),2,6
1270 HPAINT(85,150),2,6
1280 HPAINT(85,168),2,6
1290 HPAINT(35,168),2,6
1300 HPAINT(35,147),2,6
1310 HPAINT(62,180),2,6
1320 REM PLACE SHAMAS AND 1ST FL
AME
1330 HPUT(147,14)-(163,30),1,PSE
T
1340 HPUT(240,20)-(256,36),1,PSE
T
1350 REM MAIN LOOP OF PROGRAM
1370 X1=287:X2=307:DX=-2:DM=6:DB
=1
1380 IF F=0 THEN F=1:PALETTE 10,
B(MO):PALETTE 8,S(MO) ELSE IF F=
1 THEN F=0:PALETTE 10,S(MO):PALE
TTE 8,B(MO) 'FLICKER THE FLAMES
1390 PALETTE 7,RND(63) 'FLASH TE
XT
1400 IF INKEY$<>" THEN GOSUB 15
60 'ADD DAY IF KEY PRESSED
1410 CC=CC+1 'UPDATE CYCLE COUNT
FOR DRADLE
1420 DB=DB+1:IF DB=6 THEN DB=2 '
CALCULATE NEXT DRADLE FRAME BUFF
ER #
1430 X2=X2+DX:X1=X1+DX 'UPDATE D
RADLE POSITION
1440 REM CHECK FOR DRADLE OUT-OF
-BOUNDS
1450 IF X2>307 THEN X2=307:X1=28
7
1460 IF X1<219 THEN X1=219:X2=23
9
1470 REM DRAW DRADLE IN NEW POSI
TION, OLD IMAGE OVERWRITTEN
1480 HPUT (X1,170)-(X2,191),DB,P
SET
1490 IF CC<=DM THEN 1380 'IF STI
LL MOVING DRADLE, JUMP BACK TO B
EGINNING NOW
1500 DX=3-RND(RND(3)):IF RND(2)=
1 THEN DX=-DX 'NEW DRADLE SPEED
1510 IF DX=0 THEN IF RND(3)<>2 G
OTO 1500 'KILL ZEROS, ADD DELAY
1520 DM=RND(8)+2 'HOW FOR TO GO
AT THAT SPEED
1530 CC=0 'CLEAR CYCLE COUNT
1540 GOTO 1380
1550 REM ADD A FLAME
1560 HD=HD+1
1570 ON HD GOSUB 1600,1610,1620,
1630,1640,1650,1660
1580 RETURN
1590 REM HPUT STATEMENTS FOR EAC
H FLAME
1600 HPUT(212,20)-(228,36),1,PSE
T:RETURN 'DAY 2
1610 HPUT(193,20)-(209,36),1,PSE
T:RETURN 'DAY 3
1620 HPUT(170,20)-(186,36),1,PSE
T:RETURN 'DAY 4
1630 HPUT(122,20)-(138,36),1,PSE
T:RETURN 'DAY 5
1640 HPUT(101,20)-(117,36),1,PSE
T:RETURN 'DAY 6
1650 HPUT(80,20)-(96,36),1,PSET:
RETURN 'DAY 7
1660 HPUT(52,20)-(68,36),1,PSET:
RETURN 'DAY 8

```


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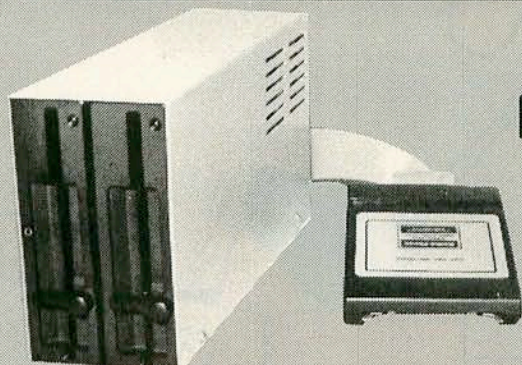
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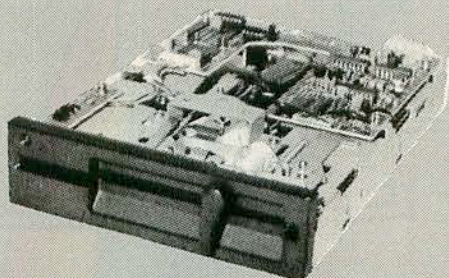
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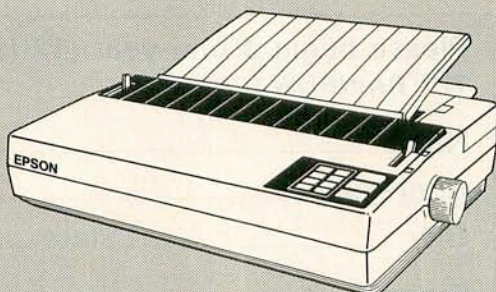
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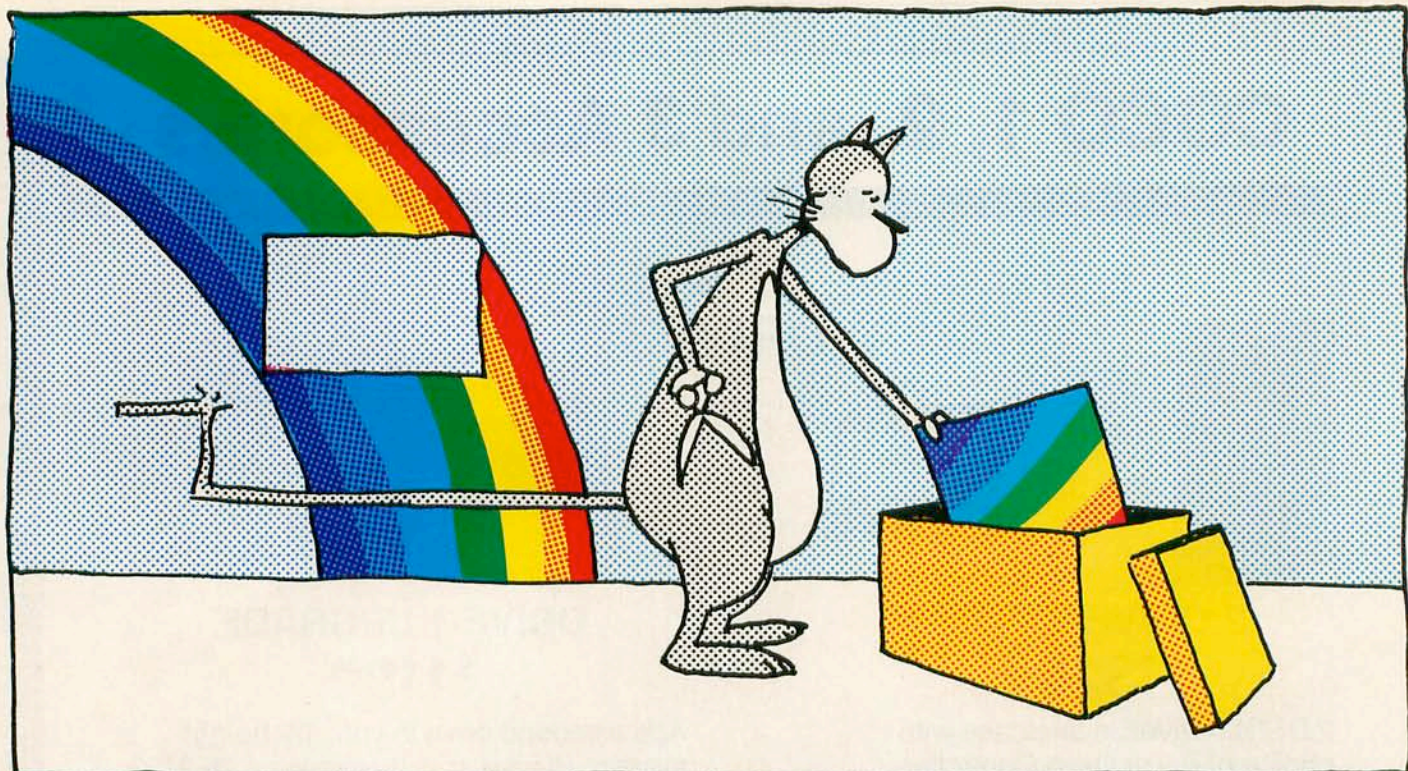
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RAINBOW

Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service. An order form for these services is on the insert card bound in the magazine.

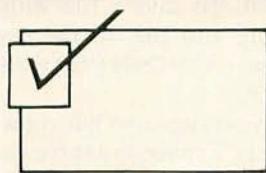
What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. (While many TDP-100s are still in service, the TDP Electronics division of Tandy no longer markets the CoCo look-alike.) It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW

and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+17B
20 CLEAR 25,X-1
30 X=256*PEEK(35)+17B
40 FOR Z=X TO X+77
50 READ Y,W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IF W=7985 THEN B0 ELSE PRINT
  "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: CMDS and SOURCE. It also contains a file, *read.me.first*, which explains the division of the two directories. The CMDS directory contains executable programs and the SOURCE directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the SOURCE directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

- 1) Type `load dir list copy` and press ENTER.
- 2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the system master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
- 3) List the *read.me.first* file to the screen by typing `list read.me.first` and pressing ENTER.
- 4) Entering *dir* will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the CMDS directory, enter `dir cmds`. Follow a similar method to see what source files are in the SOURCE directory.
- 5) When you find a program you want to use, copy it to the CMDS directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/ filename /d0/cmds/ filename -s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/ filename /d0/cmds/ filename`

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal



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The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

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Keep those files secure

Secret Filenames

By Bill Bernico

Every now and then I run across a file on a disk with a strange "name" — if you could call it a "name." It looks more like a string of graphics characters from the Lo-Res CHR\$ set.

Not knowing what it was called, I didn't know how to load, run, or even kill it. I know a little more about them now, and I'd like to share what I've found so you can save your own disk files with these strange "names." That way, other folks won't be tampering with files you don't want them looking into. Or you and your friends can keep your files extra secure on your BBS.

There are two methods of saving: with or without a graphics extension. If you opt not to include the colorful extension, BAS will be used. Write down the correct combination of CHR\$ codes that went into making up your filename or you may not get that file off the disk later.

Creating the File

Let's create a file with one of these filenames. Type in Listing 1. To save it

with the character string name, type in the following directly (no line number):

```
SAVE CHR$(128)+CHR$(145)+CHR$(162)+CHR$(179)+CHR$(196)+CHR$(213)+CHR$(230)+CHR$(247)+"/"+CHR$(159)+CHR$(175)+CHR$(191)
```

Next, type DIR and look at what you've saved. Looks a little strange, doesn't it? Even the extension has graphics characters. Later on, if you want to access that file, you'll have to know how to load it. Did you write down the combination of character strings that made up that name? It's easy to lose a file if you're not careful.

Loading the File

Now that the file is on disk, let's retrieve it. Type in Listing 2 and save it to disk. Notice that Line 20 contains the combination of character strings that you used to save Listing 1. To see how this all falls together, run this program and it will automatically load and run the first file, the one with the colorful name. Pretty slick, eh?

The third and fourth listings have the same results as the first two except these were done without graphics extensions, in which case BAS was assumed.

Character String File Syntax

Certain rules have to be followed in

order to save, load and kill files with these types of "names." The most important rule is to know what you called that particular file. Without knowing what combination of character strings made up that filename, the rest of these rules won't help you at all.

First, to save a file with a CHR\$ name, type in or load the file you want to save (the old file with the regular name). Next, in the immediate mode, type in the following:

```
SAVE CHR$(X1)+CHR$(X2)+CHR$(X3)+CHR$(X4)+CHR$(X5)+CHR$(X6)+CHR$(X7)+CHR$(X8)
```

This will save the file with a BAS extension. To save a file with a CHR\$ extension, add this to the end of the SAVE line: +"/"+CHR\$(Y1)+CHR\$(Y2)+CHR\$(Y3).

Now your filename has eight colorful characters, a space and three more color blocks. To load this file, simply substitute the word LOAD for the word SAVE in the example above.

Killing a file like this is a little different. If it has a regular BAS extension, you have to substitute the word KILL for the word LOAD in the example above and add +"/"+BAS to the end of the line. If it has a "color block" extension, add +"/"+CHR\$(Y1)+CHR\$(Y2)+CHR\$(Y3) to the end of the line.

In each of these examples, X1 through X8 represents the number of the char-

Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.

acter string color block you want to use. The examples Y1 through Y3 represent the color blocks used in the extension. They can be the same as the ones used in the name. I just used these examples for clarity.

I think the benefit of this system is that someone else can't easily break into

and modify my file. They can if they read this article, but they didn't count on one thing — the fact that you can also use character strings that can't be seen: CHR\$(13), CHR\$(32) and CHR\$(143), for example. These are ENTER, space bar and a green block, which is invisible on a green back-

ground. Someone could try different combinations until the cows come home and still not hit upon your combination. The possibilities are endless.

(Questions about this program may be directed to the author at 708 Michigan Ave., Sheboygan, WI 53081. Please enclose an SASE for a reply.) □

Listing 1:

```
1Ø CLS
2Ø PRINT"THIS IS A TEST FOR THE
DISK CHARACTER STRING FILE S
AVING ROUTINE.
3Ø PRINT:PRINT"TEST 1 COMPLETED.
SEE. IT WORKS!
```

Listing 2:

```
1Ø CLS
2Ø LOAD CHR$(128)+CHR$(145)+CHR$(
162)+CHR$(179)+CHR$(196)+CHR$(2
13)+CHR$(23Ø)+CHR$(247)+"/"+CHR$(
159)+CHR$(175)+CHR$(191),R
```

Listing 3:

```
1Ø CLS
2Ø PRINT"THIS IS A TEST FOR THE
DISK FILE CHARACTER STRING S
AVE ROUTINE WITHOUT THE GRA
PHIC EXTENTION.
3Ø PRINT:PRINT"THIS PROCEDURE DI
FFERS SLIGHTLY FROM TEST 1 IN TH
E WAY FILES ARE LOADED, SAVED
AND KILLED.
4Ø PRINT:PRINT"TEST 2 COMPLETED.
SEE. IT WORKS!
```

Listing 4:

```
1Ø CLS
2Ø LOAD CHR$(2Ø3)+CHR$(195)+CHR$(
198)+CHR$(2Ø4)+CHR$(2Ø1)+CHR$(1
99)+CHR$(2ØØ)+CHR$(193),R
```

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12 Voices
4 Noise Generators
Lyra Compatible
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Stereo & Mono
Sound Effects

If you want to compose music, experiment, or just listen to music, LYRA is the tool you need. LYRA represents the new state-of-the-art super user friendly software. Pull down menus and icons make composing music as easy as pointing with a joystick or mouse and clicking. LYRA is capable of 8 individually controlled voices. You may take advantage of the 8 voice power of LYRA using external MIDI synthesizers or SYMPHONY 12. We believe that LYRA and SYMPHONY 12 was a match made in heaven. For a limited time, when you purchase both, we will include free the LYRA SYMPHONY 12 CONNECTION, a \$19.95 value.

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CoCo's Premier Music Synthesizer



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#LS177 \$19.95

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SPEECH SYNTHESIZER.**

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MORE.**

only . . . \$79.95

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Compatible**

SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

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	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4



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Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that

you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call (312) 879-6844, you won't believe your ears or our EARS.

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You Get Everything You Need. You get everything you need including a specially designed professional headset style noise

cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE \$20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for \$59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save \$20.

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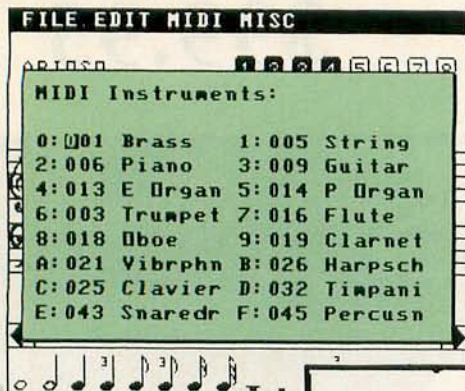


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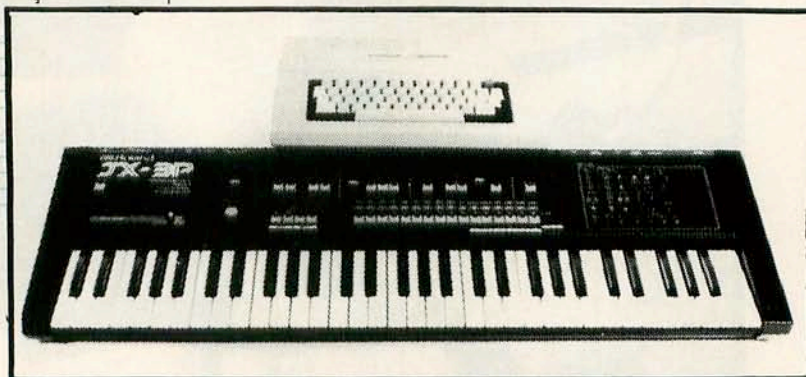


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COCO MIDI 2

**Lyra
COMPATIBLE!**

*Coco 1, 2, 3
Compatible*



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"Understanding
MIDI"
80 pages \$3.95*

**NOW Print
Single Voice/
Track files
using
LYRA PRINT
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entry level MUSICA MIDI system that plays MUSICA files or our Professional COCO MIDI 2 system.

- ✓ Supports 16 Track recording and playback.
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- ✓ Record to any track.
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- ✓ LYRA editing. (one voice per track).
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- ✓ Dynamic memory allocation.

- ✓ Filter out MIDI data:
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 - Program change
 - Pitch wheel
- ✓ Graphic Piano Keyboard Display in both record and playback mode.
- ✓ Adjustable Key (Transposition) for each track.
- ✓ Save recording to disk for later playback or editing.
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Control Change
Channel Pressure
System Message

- ✓ PUNCH IN and PUNCH OUT editing.
 - ✓ Sequencer features.
 - ✓ 100% machine code.
 - ✓ "Musician Friendly" Menu Driven.
 - ✓ Metronome
 - ✓ Many songs included.
- Includes MIDI hardware interface, 2 MIDI cables, detailed manual, and software. Requires 64K CoCo, Y-Cable or Multi-Pak.
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If you own the Casio CZ-101 or similar MIDI synth, you know that the mini keys and the short 3 or 4 octave keyboard is limiting. **MIDI KEYBOARD** when used with our full size 5 octave keyboard

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GEMINI, PANASONIC
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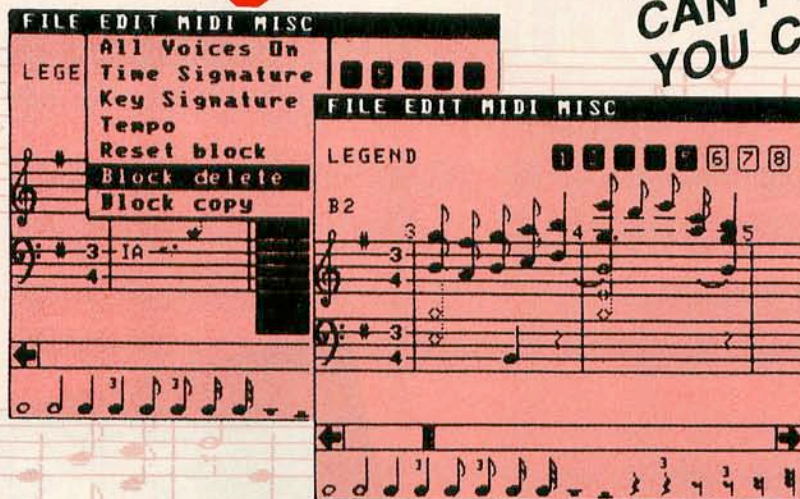
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The Musical
Coco Max™

IF YOU
CAN POINT,
YOU CAN COMPOSE

PULL
DOWN
MENUS

ICONS!



Coco 1, 2, 3
Compatible

A MUST
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LYRA is the most powerful music composition program we have seen on any computer. We don't mean just the COCO, we really mean any computer. Whether you are a novice trying to learn music or a professional musician with MIDI equipment you will find LYRA a powerful tool. You

see, we wrote LYRA for musicians that hate computers. If you want proof, purchase a LYRA demo for \$7.95. We will apply the demo price to your purchase. MIDI output requires the LYRA MIDI cable (#MC158) or COCO MIDI Seq/Editor (#CM147).

- ✓ Ultra Easy to use, just point with joystick or mouse and click.
- ✓ Compose with up to 8 completely independent voices.
- ✓ Room for over 18,000 notes. (This is not a misprint!)
- ✓ Super Simple Editing Supports:
 - Note insert Block insert
 - Note delete Block delete
 - Note change Block copy
- ✓ Output music to:
 - TV Speaker Monitor Speaker
 - STEREO PAK ORCHESTRA 90
 - SYMPHONY 12 COCO MIDI S/E
 - MIDI Synth MIDI Drum Machine
- ✓ Output up to 4 voices without additional hardware.

- ✓ Output all 8 voices using either SYMPHONY 12 or one or more MIDI synthesizers and drum machines.
- ✓ Output any voice on any of the 8 MIDI channels.
- ✓ Transpose music to any key.
- ✓ Modify music to any tempo.
- ✓ Automatically inserts bar for each measure as you compose.
- ✓ Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- ✓ Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- ✓ Each voice may be visually highlighted or erased.
- ✓ Each measure is numbered for easy reading.

- ✓ Solo capability
- ✓ Block edits are highlighted.
- ✓ Tie notes together for musical continuity.
- ✓ Name of note pointed to is constantly displayed.
- ✓ Jump to any point in the score instantaneously.
- ✓ Memory remaining clearly displayed, however you will have plenty of memory even for the most demanding piece.
- ✓ Help menu makes manual virtually unnecessary.
- ✓ LYRA is 100% software, no need for extra hardware unless you want more power.
- ✓ Music easily saved to tape or disk.
- ✓ Requires 64K and mouse or joystick.

LYRA (Disk only) #LY122 \$54.95

LYRA OPTIONS

These LYRA options are **not** required. They are provided for those wishing additional flexibility.

LYRA CONVERT

A program to convert MUSICA 2 files to LYRA files.
(Disk) #LC164 \$14.95

VERSION UPDATE

To receive the latest version of LYRA return your original disk. #UP162 \$10.00

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Keep Your Memories in Order

By Donald Turowski

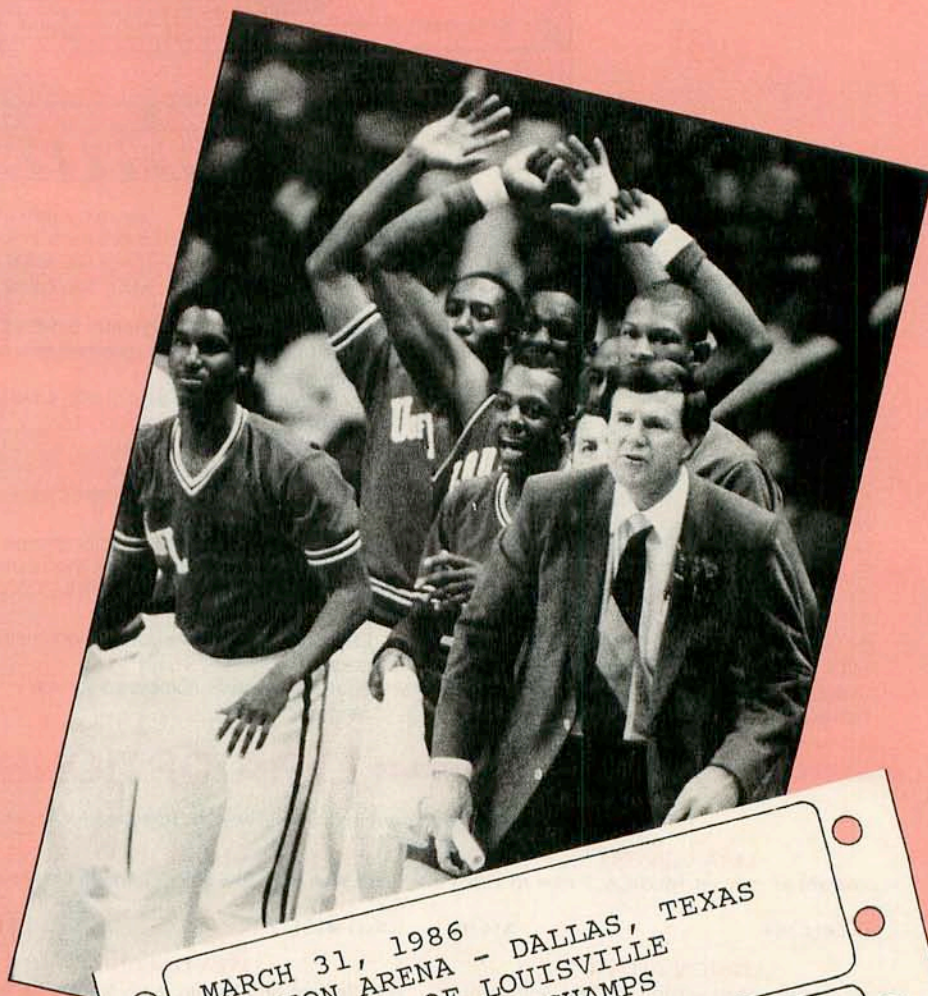
Have you ever looked through your photos months or years after they were taken and asked yourself, "Who's standing next to Uncle George?" or perhaps the most asked question about Halloween photos — "Who was that masked man?"

Well, *Photo Tagger* is here! It's a handy utility that prints photo information on mailing labels, which you stick on the back of your photos for future reference. No more wondering about when and where the picture was taken, who is in it and other easily forgotten information.

Photo Tagger works with any 16K or larger Color Computer with Extended Color BASIC. It is compatible with both cassette and disk systems and works with Radio Shack DOS, JDOS and ADOS. And, of course, it does require a printer to produce the labels. Radio Shack one-wide fanfold labels (Cat. No. 26-1328, or similar labels) are also required.

To use *Photo Tagger*, load the program, type RUN and press ENTER. On a 16K CoCo, you will need to enter PCLEAR1 prior to loading the program.

Donald Turowski has a bachelor's degree in education and teaches algebra and computer literacy in the Burrells School District in Natrona Heights, Pennsylvania. He is married and has two children.



MARCH 31, 1986
REUNION ARENA - DALLAS, TEXAS
UNIVERSITY OF LOUISVILLE
1985-86 NATIONAL CHAMPS

COACH DENNY CRUM AND TEAM
CELEBRATE A 72-69 WIN OVER
DUKE, WINNING THEIR SECOND
NCAA TITLE OF THE DECADE.

A title screen appears and then you will be asked if you want instructions. Of course, you can bypass them.

Next, a message appears on the screen, prompting you to turn on the printer, and the program internally checks to see if it is on. If it is not, a message appears alerting you that the printer is not online. Once it is turned on, the message disappears and the program continues. The next message prompts you to line up the labels with the print head.

Now you are ready to begin the data entry routine. Place one of your snapshots in front of you and begin entering the information that is asked for by *Photo Tagger*. The first question is "Date of Picture?" This can be entered in any manner, such as 11/12/86 or November 12, 1986, or simply Summer 1986. (Since LINE INPUT statements are used in the program, commas may be used with no difficulty. If INPUT statements had been used, this would not be possible.)

The next question is "Location of Picture?" You have 29 characters to work with for each of these prompts. An entry such as "Disney World, Orlando" would be fine, but "Disney World,

Orlando, Florida" would be too long, unless you eliminated the spaces. If your entry is too long, *Photo Tagger* alerts you, asking you to reenter the information in a shorter version.

The third question is "People, Places, Things in Picture?" Be creative in entering this information, keeping in mind the 29 character-length maximum. Also, if you feel you need more than one line for this type of information, you can continue it in Question 4.

Question 4 is "Further Information?" If you need to continue with information on people, places and things (from Question 3), then by all means do so. And, if you do not want to add any further information, simply press ENTER, which prints a blank line on the label.

After you enter all this information, you will be asked to approve of your entries by answering the prompt, "Is This Correct?" If the information is acceptable, press Y, and printing begins. But if you see a mistake, press N and you will be given an opportunity to reenter your information.

When prompted for the Date of Picture, you do not have to reenter the information if it is already correct;

Photo Tagger has a built-in feature that allows you to type a slash mark (/) to keep the current data. This means that if your only mistake was on Location of Picture, and everything else is correct, then you could enter a / for Date of Picture, enter the corrected information for the Location, and then simply enter / for each of the remaining two questions. This makes *Photo Tagger* very easy to use and edit.

This feature is also very helpful when all of your pictures have the same date, location or subject. Simply enter / for each question and you can produce your labels quickly and easily.

Once you use *Photo Tagger*, you will see how helpful the CoCo can be in keeping track of information that is routinely forgotten. No more wondering and guessing "Is that really Aunt Mary next to Uncle Bill?" or "Was this taken on Johnny's 14th or 15th birthday?" Now then, let me see, was that masked man in the spandex tights and red cape really Cousin Frank or Uncle Bob or . . .

(Questions about this program may be directed to the author at 1236 Ninth Avenue, Natrona Heights, PA 15065. Please enclose an SASE for a reply.) □

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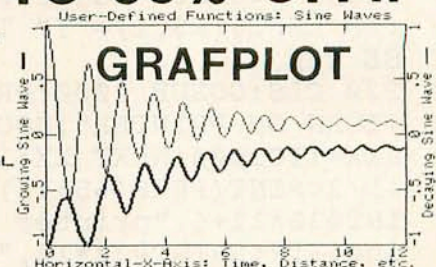
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The listing: PHOTOTAG

```

10 *****
20 * PHOTO TAG *
30 * UTILITY *
40 * BY *
50 *D.A.TUROWSKI*
60 * AUGUST '86 *
70 *****
75 CLEAR5000
80 CLS(0):FOR X=3 TO 61:SET(X,5,
8):SET(X,25,8):NEXT X:FOR Y=5 TO
25:SET(3,Y,8):SET(61,Y,8):NEXT
Y
90 FOR Y=2 TO 4:SET(54,Y,4):SET(
58,Y,4):NEXT Y:FOR X=54 TO 58:SE
T(X,2,4):NEXT X
100 FOR X=10 TO 50:SET(X,7,2):SE
T(X,20,2):NEXT X
110 FOR Y=7 TO 20:SET(10,Y,2):SE
T(50,Y,2):NEXT Y
120 FOR X=7 TO 9:SET(X,8,6):NEXT
X
130 GOTO 1000
200 REM
210 CLS(RND(8)):GOSUB 2000:PRINT
@32*8,"DO YOU NEED INSTRUCTIONS
ABOUT <photo-tagger>";:INPUT R$
:IF LEFT$(R$,1)="Y" THEN 3000 EL
SE 220
220 CLS:GOSUB 2000:PRINT@32*3,"1
)TURN ON PRINTER":SOUND 200,3:FO
RXX=1TO1000:NEXT XX:IF PEEK(6531
4)/2<>INT(PEEK(65314)/2) THEN PR
INT@32*11+6,"printer is not on l
ine!!!":PRINT@32*12,"turn printe
r on at this time!!!":FORXX=1TO1
000:NEXT XX:GOTO220
230 CLS:GOSUB 2000:PRINT@32*5,"2
)LINE UP LABELS IN PRINTER WITH
PRINT HEAD AT THIS TIME":SOUND
230,2
240 PRINT@32*10," PRESS ANY KE
Y TO CONTINUE":EXEC44539
250 PLAY"O3;V31;L10;A;V16;A;V8;A
;V3;A;V1;L20;A"
255 CLS(RND(8)):GOSUB 2000
257 PRINT@32*14,"[press / to kee
p last entry!!!!]";
260 PRINT@32*7,"date of picture"
;: LINE INPUT A$:IF LEN(A$)>29 T

```

```

HEN PRINT "LINE TOO LONG, PLEASE
RE-ENTER":GOTO 260
261 IF A$="/" THEN A$=E$:GOTO 27
0
262 E$=A$
270 PRINT"location of picture":L
INE INPUT B$:IF LEN(B$)>29 THEN
PRINT "LINE TOO LONG, PLEASE RE-
ENTER":GOTO 270
271 IF B$="/" THEN B$=F$:GOTO 28
0
272 F$=B$
280 PRINT"people,places,things i
n picture":LINE INPUT C$: IF LEN
(C$)>29 THEN PRINT"LINE TOO LONG
, PLEASE RE-ENTER":GOTO 280
281 IF C$="/" THEN C$=G$:GOTO 29
0
282 G$=C$
290 PRINT"further information":L
INE INPUT D$: IF LEN(D$)>29 THEN
PRINT"LINE TOO LONG, PLEASE RE-
ENTER":GOTO 290
291 IF D$="/" THEN D$=H$:GOTO 30
0
292 H$=D$
300 CLS(RND(8)):GOSUB 2000:PRINT
@32*4,"is this correct?":PRINTST
RING$(32,"-");:PRINT@32*6,A$:PRI
NTB$:PRINTC$:PRINTD$:PRINT STRIN
G$(32,"-");:SCREEN 0,1
310 R$=INKEY$:IF R$="" THEN 310
315 IF R$="Y" OR R$="y" THEN 320
316 IF R$="N" OR R$="n" THEN 255
317 GOTO 310
320 REM ROUTINE TO PRINT ON THE
LABELS
325 PRINT@32*14+8,"stand by-prin
ting!!";
330 PRINT#-2,A$
340 PRINT#-2,B$
350 PRINT#-2,C$
360 PRINT#-2,D$
370 PRINT#-2:PRINT#-2
380 PRINT@32*14,"press <C> TO CO
NTINUE,<E> TO END";:LINE INPUT R
$:IF R$="C" THEN 255 ELSE IF R$=
"E" THEN END ELSE 380
1000 REM ROUTINE FOR TITLE SCREE
N
1010 A$=CHR$(34)+"photo"+CHR$(12
8)+"tagger"+CHR$(34):L=5:GOSUB10
60
1020 A$="by":GOSUB1070
1030 A$="d.a.turowski":GOSUB1070
1040 A$="august--1986":GOSUB1070

```


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```

1050 GOTO 1180
1060 REM CLS(0)
1070 M=LEN(A$)
1080 FOR X=1 TO M
1090 PRINT@32*L+15-M/2+X,MID$(A$,X,1);
1100 SOUND100,1
1110 NEXT X
1120 L=L+1
1130 SOUND 200,1
1140 FOR S=1 TO 80:NEXT S
1150 RETURN
1160 'ROUTINE BY JOHN D. BOYLE
    FROM RAINBOW MAGAZINE 2/85
1170 'PROGRAM LISTING 2
1180 SCREEN 0,1:FOR XX=1 TO 500:
:NEXT XX:FOR YY=1 TO 3:PLAY"O3;V31
;L10;A;V16;A;V8;A;V3;A;V1;L20;A"
:NEXT YY
1190 GOTO 200
2000 PRINT@10,"photo"+CHR$(128)+
"tagger";:PRINT@32*2+8,"by"+CHR$(
128)+"d.a.turowski";:RETURN
3000 CLS:PRINT:PRINT"photo-tagge
r IS A UTILITY TO HELP YOU KE
EP TRACK OF YOUR PHOTOS. IT
WILL PRODUCE ON A MAILING LAB

```

EL THE INFORMATION THAT YOU US
UALLY FORGET TO WRITE ON THE BACK
OF THE PHOTO SUCH AS THE DATE, P
EOPLE OR PLACES IN"

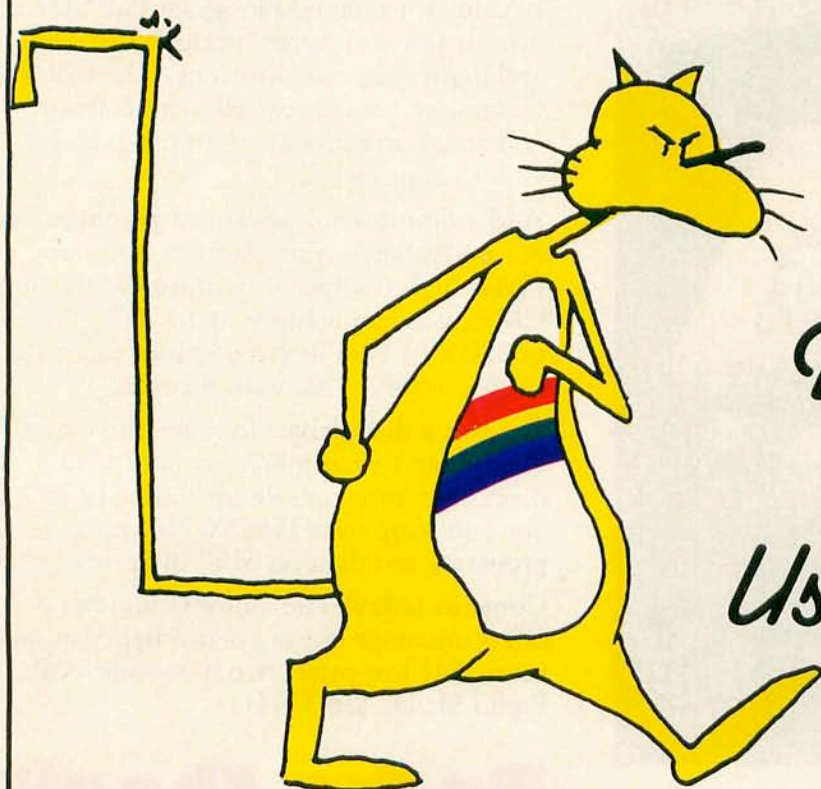
3010 PRINT"THE PHOTO, AND ALSO A
NY OTHER GENERAL INFORMATION Y
OU MAY WANT TO REMEMBER!"

3015 PRINT@32*15+5,"HIT ANY KEY
TO CONTINUE";:EXEC 44539

3020 CLS:PRINT:PRINT"photo-tagge
r IS SELF-PROMPTING AND BY USIN
G IT AFTER YOU GET A NEW B
ATCH OF PICTURES, YOU AND YOUR CO
MPUTER CAN QUICKLY PRODUCE LAB
ELS TO PLACE ON THE BACK OF EAC
H PICTURE."


3025 PRINT"ALSO, IF YOU ARE TYPI
NG THE SAME INFORMATION REPEATEDL
Y FOR A SET OF PICTURES, FOR EXAM
PLE, THE SAME DATE, BY PRESSIN
G THE '/' KEY, photo-tagger WIL
L DEFAULT TO THE LAST USED ENTR
Y. ENJOY!!"

3030 PRINT@32*15,"press <enter>
to begin photo-tag";:EXEC 44539:
GOTO 220



*CoCo Cat
Says*

*Drugs Are
NOT
User-Friendly*



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Taking it to the streets

On the Road Again

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.

Several months ago I presented *Road Skills I*, the first drivers' education software for the Color Computer. The program worked in 16K Color BASIC and provided a quick overview of driving rules common in all 50 states. I have used the program with my students and find it to be quite useful in preparing them for their learner's permit test.

The ink had barely dried on the issue containing *Road Skills* (September 1987, Page 90) when RAINBOW managing editor Jutta Kapfhammer suggested I follow up with a possibility I hinted at in the article — that I could come up with a "Part II" involving the various road, highway and traffic signs. Since readers are always asking me to write more graphic programs that would work on the CoCo 1 and 2, as well as 3, *Road Skills II* seemed like a logical progression. Also, many people have written asking for more software for the Speech/Sound Pak.

Therefore, readers, here you are: the first fully graphic drivers' education program for the Color Computer.

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

The Goal

Road Skills I simply gave users a chance to review standard driving information on an inverse video screen. The program allowed you to review the material as much as you wanted, later allowing you to quiz yourself on the information. Its only graphics were Lo-Res illustrations showing the right-of-way laws at intersections.

In order to create the graphics required to display various traffic signs, I wrote *Road Skills II* in Color Extended BASIC. However, to save memory, I did use PMODE2/1 for both illustrations and graphic text displays. The results are very attractive. However,

there is one difference between the two programs.

Where *Road Skills I* might have seemed very academic, *Road Skills II* could strike some of you as a bit more elementary. I mean, how much intelligence does it take to realize a stop sign means *stop*?

However, there is some value to this kind of program. It can be used with younger students who are years from their driving permits. It's never too early to learn the meaning of warning signs. Add to that the use of the Speech/Sound Pak (optional, of course) and you have a program that is suitable for both younger and older students.



YOU MUST ALWAYS
OBEY A STOP SIGN
WHEN YOU SEE IT.

Using the Program

As with all my programs, take great care to be very precise in typing it in, especially the DATA statements. One mistake in the data and the program will not run properly. Also, since the program contains poke commands, be sure to save it to tape or disk before trying to run it. A misplaced POKE could cause you to lose all of your typing by locking up your machine.

As with some of my other recent graphic educational programs, I have redrawn a graphic text character set to display our writing in a number of colorful ways. All of the text will be drawn out of view on graphic pages 3 and 4, later being copied (by PCOPY) to pages 1 and 2, which we are viewing. The same goes for all of our graphic signs. This way, they just pop into view, like a fancy machine language program.

On running the program, you will be asked if you want (T)alking or (N)ot. If you press T with the Speech Pak in place, the program will advance itself. Pressing N for no talking will allow the user to pace himself or herself by pressing ENTER to advance to each new screen. Thus, if you have a small child who cannot read, you can advance the

screens along while you read the material to him or her.

Next, either a red or blue screen appears. Press ENTER if the screen is red. If the screen is blue, press the reset button and run until the screen is red. This sets the correct color pattern for our signs. (You wouldn't want a blue stop sign, now, would you?)

"This way is better for this program."

You may wonder why I'm not using my old technique of setting a variable from the color on the screen. Believe it or not, in some graphics, that is not suitable. It has more to do with pixel location than anything else. Take my word for it — this way is better for this program.

There is no quiz in this program. It would be too difficult to fit questions and the graphics on the screen all at once. Therefore, this program is strictly educational and not diagnostic, like *Road Skills I*.

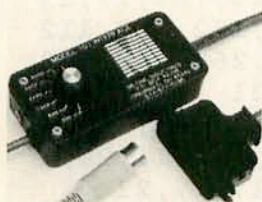
You will notice that I have not covered a lot of different signs, but have instead concentrated on categories with examples. On running the program, you will see what I mean. Of course, that leaves the door open for parts III and IV, if necessary. One such program could even deal with pedestrian signals for youngsters. Let me know if you would find such a program valuable. (I know some of my more limited special needs students would definitely benefit from such a program.)

At the conclusion of the last frame, the program will rerun itself for another person to sit and watch. When you use the program, you will find that it actually does take some time to listen to. Even done without speech, the program is lengthy and contains quite a bit of information. Only you can decide how valuable it can be for your family or students.

If you can suggest some additional areas that this drivers' education series can cover, drop me a line. I am always looking for new ideas.

Until next month, thank you for all your kind letters of support. They mean a great deal to me when my typing fingers get sore. □

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The Model 101, 102, 104 and 105 work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty**.

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Itoh, Seikosha, Panasonic and many others. They support BASIC print commands, word processors and graphic commands.

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36564		

The listing: ROAD II

```

1 REM*****
2 REM*   DRIVING INSTRUCTOR 2   *
3 REM*   KNOWING ROAD SIGNS    *
4 REM*   BY FRED B.S CERBO      *
5 REM*   6Ø HARDING AVE         *
6 REM*   NORTH ADAMS,MA Ø1247   *
7 REM*   COPYRIGHT (C) 1987     *
8 REM*****
1Ø CLSØ:CLEAR1ØØØ:FORI=1TO32:PRI
NTCHR$(188);:NEXT:FORI=1TO192:RE
ADA:IFA=ØTHENA=16
15 PRINTCHR$(A+112);:NEXT
2Ø DATA126,124,122,126,124,122,1
26,124,122,125,124,125,,,3Ø,28,2
6,29,,,3Ø,2Ø,3Ø,2Ø,3Ø,16,2Ø,3Ø,,
21,28,29
25 DATA122,,122,122,,122,122,96,
122,117,,117,,26,,24,21,16,22,1
6,,26,,26,,16,26,,21,,2Ø
3Ø DATA123,115,122,122,,122,123,
115,122,117,96,117,,27,19,18,21
,22,16,,26,,26,,16,26,,21,19,19
35 DATA122,117,,122,,122,122,112
,122,117,112,117,,26,21,2Ø,18
,,26,,26,,16,26,,21
4Ø DATA122,117,96,122,,122,122,,
122,117,,117,,16,26,,26,21,2Ø,1
8,,26,,26,21,16,26,21,21,,21
45 DATA122,117,114,123,115,122,1
22,112,122,119,115,119,,27,19,2
6,23,18,,27,17,27,17,27,23,17,27
,23,21,19,23
5Ø FORI=1TO32:PRINTCHR$(179);:NE
XT
55 PRINT@293," DRIVING INSTRUCTO
R 2 ";
6Ø PRINT@325," KNOWING ROAD SIG
NS ";:PRINT@389," BY FRED B.S
CERBO ";
65 PRINT@421," COPYRIGHT (C) 19
87 ";
7Ø PRINT@485," (T)ALKING OR (N)O
T ? ";
75 X$=INKEY$:IFX$="T"THEN95
8Ø IFX$="N"THEN9Ø
85 GOTO75
9Ø NT=1
95 CLSØ
  
```



```

100 XX=&HFF00:YY=&HFF7E
105 POKEXX+1,52:POKEXX+3,63
110 POKEXX+35,60
115 PMODE4,1:PCLS1
120 DIMR(23),L$(26),Y(40):C$(1)="C1":C$(2)="C2":C$(3)="C3":C$(4)="C4"
125 FORI=1TO26:READL$(I):NEXT
130 GOTO260
135 AA$=JK$
140 A$=STR$(A):B$=STR$(B)
145 DRAW"S4BM"+A$+"", "+B$+C$(CL)
150 IF LEN(JK$) <= 21 THEN 170
155 FOR T=21TO0STEP-1:IF MID$(JK$,T,1)=" " THEN 165
160 NEXT T:GOTO170
165 L$=LEFT$(JK$,T):W$=L$:GOSUB175:JK$=" "+RIGHT$(JK$, (LEN(JK$))-T):GOTO140
170 W$=JK$:B=B+14:GOSUB175:RETURN
175 SL=LEN(W$):FORI=1TOSL:BB$=MID$(W$,I,1):C=ASC(BB$)-64:IF C=-32 THEN DRAW"BR12":GOTO195
180 IF C=-18 THEN DRAW"BR2RBR9":GOTO195
185 IFC=-20 THEN DRAW"BR2R2D2G2E4BR7":GOTO195
190 DRAWL$(C)
195 NEXTI:B=B+14:RETURN
200 IFNT=1 THEN 240
205 FORII=1TOLEN(AA$)
210 IF PEEK(YY) AND 128=0 THEN 210
215 POKEYY,ASC(MID$(AA$,II,1))
220 NEXTII
225 IF PEEK(YY) AND 128=0 THEN 225
230 POKEYY,13
235 FORHH=1TO1600:NEXTHH:RETURN
240 FORHH=1TO3000
245 X$=INKEY$:IFX$=CHR$(13) THEN 255
250 NEXTHH
255 RETURN
260 PMODE2,1:PCLS1:SCREEN1,1:PMODE1:SCREEN1,1:PCLS0:POKE65314,248
265 PCLS3:A=0:B=56:CL=4:JK$="PRESS RESET AND RUN IF SCREEN IS BLUE.":GOSUB135:B=B+20:JK$="PRESS ENTER WHEN THE SCREEN IS RED.":GOSUB135
270 X$=INKEY$:IFX$<>CHR$(13) THEN 270
275 PCLS0:SCREEN0,0:R=3:BL=2:FORI=0TO256STEP4:PSET(I,1,3):PSET(I+2,3,3):NEXT:DIMA(20):GET(0,0)-(256,4),A,G:PCLS0
280 DATA U6E2R2F2D2NL4D4BR6,U8R4

```

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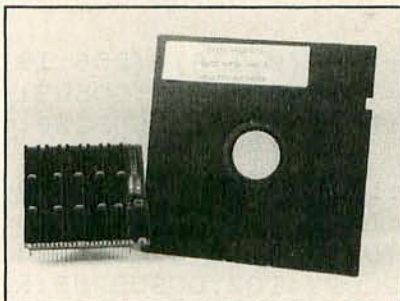
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```

F2G2NL4F2G2NL4BR8,U8R4BD8NL4BR6,
U8R4F2D4G2NL4BR8,U8NR4D4NR4D4R4B
R6,U8NR4D4NR4D4BR1Ø,U8R6BD4NL2D4
NL4BR6,U4NU4R6U4D8BR6
285 DATA R2U8L2R4L2D8R2BR6,NU4R4
U8L4R6BD8BR6,U8D4R2NE4F4BR6,NU8R
4BR6,U8F4E4D8BR6,U8F6NU6D2BR6,U8
R6D8NL6BR6,U8R6D4L6D4BR12,U8R6D8
NL6NH4NF2BR6
29Ø DATA U8R6D4L4F4BR6,R6U4L6U4R
6BD8BR6,BR4U8L4R8BD8BR6,NU8R6NU8
BR6,BU8D4F4E4U4BD8BR6,NU8R4NU6R4
NU8BR6,E8G4H4F8BR6,BU8D2F4ND2E4U
2BD8BR6,NR8E8NL8BD8BR6
295 PMODE2,1:PCLS1:SCREEN1,1:PMO
DE1:SCREEN1,1:PCLSØ:POKE65314,24
8:PMODE2,3:PMODE1,3:COLOR2,3:GOT
O32Ø
3ØØ COLOR2,3:LINE(Ø,138)-(256,19
2),PSET,BF:B=152:A=Ø:CL=1:GOSUB1
35:PCOPY3TO1:PCOPY4TO2:GOSUB2ØØ:
RETURN
3Ø5 COLOR3,2:LINE(Ø,138)-(256,19
2),PSET,BF:B=152:A=Ø:CL=1:GOSUB1
35:PCOPY3TO1:PCOPY4TO2:GOSUB2ØØ:
RETURN
31Ø COLOR1,1:LINE(Ø,138)-(256,19
2),PSET,BF:B=152:A=Ø:CL=3:GOSUB1
35:PCOPY3TO1:PCOPY4TO2:GOSUB2ØØ:
RETURN
315 COLOR2,4:LINE(Ø,138)-(256,19
2),PRESET,BF:LINE(Ø,138)-(256,19
2),PSET,B:B=152:A=Ø:CL=3:GOSUB13
5:PCOPY3TO1:PCOPY4TO2:GOSUB2ØØ:R
ETURN
32Ø PCLS4:COLOR2,3:LINE(Ø,Ø)-(25
6,92),PSET,BF:B=16:A=Ø:CL=1:JK$=
" THIS PROGRAM WILL INTRODUCE YO
U TO SOME OF THE MOST COMMON ROA
D SIGNS USED IN THE UNITED STATE
S TODAY.":GOSUB135:PCOPY3TO1:PCO
PY4TO2:GOSUB2ØØ
325 COLOR3,2:LINE(Ø,98)-(256,192
),PSET,BF:A=Ø:CL=1:JK$=" WHILE N
OT ALL SIGNS USED HAVE BEEN INCL
UDED, THE SIGNS PRESENTED ARE A
GOOD CROSS SECTION OF THOSE IN U
SE.":GOSUB135:PCOPY3TO1:PCOPY4TO
2:GOSUB2ØØ
33Ø PCLS4:DRAW"S16C3BM128,12ØR1Ø
E1ØU1ØH1ØL2ØG1ØD1ØF1ØR1Ø":PAINT(
128,2Ø),3,3:DRAW"C4BM128,116R9E9
U1ØH9L18G9D1ØF9R9"
335 JK$=" THIS IMPORTANT ROAD SI
GN HAS EIGHT SIDES AND IS RED.":
GOSUB3ØØ
34Ø JK$=" THIS ROAD SIGN IS THE
ONLY ONE WHICH IS THIS SHAPE.":G

```

```

OSUB3Ø5
345 JK$=" IT IS ALWAYS RED AND I
S PRINTED WITH LARGE WHITE LETTE
RS.":GOSUB31Ø
35Ø DRAW"S12BM62,72C4"+L$(19)+L$
(2Ø)+L$(15)+L$(16):JK$=" YOU MUS
T ALWAYS OBEY A STOP SIGN WHEN Y
OU SEE IT.":GOSUB315
355 JK$=" YOU MUST COME TO A COM
PLETE STOP WHEN YOU SEE IT.":GOS
UB3ØØ
36Ø JK$=" YOU MAY THEN PROCEED W
HEN IT IS SAFE TO DO SO.":GOSUB3
1Ø
365 PCLS4
37Ø DRAW"S24BM128,132C1R2M+16,-2
ØH2L3ØG2M+16,+2ØR2"
375 DRAW"S25BM134,126C3M+14,-18H
L26GM+14,+18"
38Ø DRAW"BM134,86M+7,-9HL12GM+7,
+9":PAINT(128,18),3,3
385 JK$=" THIS TRIANGULAR SHAPED
SIGN IS USED FOR JUST ONE SIGN.
":GOSUB3Ø5
39Ø JK$="YIELD":B=42:A=1Ø8:CL=3:
GOSUB135:JK$=" YIELD MEANS THAT
YOU DO NOT HAVE THE RIGHT OF WAY
.":GOSUB3ØØ
395 JK$=" YIELD MEANS YOU MUST L
ET THE OTHER CAR GO BEFORE YOU.":
GOSUB315
4ØØ JK$=" YOU MAY EVEN HAVE TO S
TOP BEFORE THE WAY TO GO IS CLEA
R.":GOSUB3ØØ
4Ø5 GOSUB41Ø:GOTO43Ø
41Ø PCLS4:DRAW"S8C1BM128,6R2M+38
,+3ØDM-38,+3ØL4M-38,-3ØUM+38,-3Ø
R2"
415 PAINT(128,1Ø),1,1
42Ø FORI=ØTO128STEP4:PUT(Ø,I)-(2
56,I+3),A,OR:NEXT
425 DRAW"S8C1BM13Ø,1ØM+36,+28M-3
6,+28M-36,-28M+36,-28":RETURN
43Ø JK$=" WARNING SIGNS ARE DIAM
OND SHAPED AND ARE YELLOW AND BL
ACK":GOSUB3ØØ
435 JK$=" SOME WARNING SIGNS HAV
E WORDS WHILE SOME OTHERS DO NOT
.":GOSUB3Ø5
44Ø JK$=" THEY ARE USED TO SHOW
THAT SOME KIND OF DANGER IS AHEA
D.":GOSUB315
445 DRAW"S12BM128,3ØC1R4D1ØR12D4
L12D1ØL6U1ØL12U4R12U1ØR2":PAINT(
128,34),1,1:JK$=" THIS SIGN IS S
EEN BEFORE COMING TO AN INTERSEC
TION.":GOSUB31Ø
45Ø GOSUB41Ø:DRAW"S8BM86,74C1"+L

```



```

$(19)+L$(12)+L$(15)+L$(23):JK$="
THIS SIGN MEANS THAT YOU SHOULD
SLOW DOWN.":GOSUB300
455 JK$=" IT MEANS THAT ROAD CON
DITIONS ARE NOT SAFE FOR HIGH SP
EEDS":GOSUB315
460 GOSUB410:DRAW"S8BM110,94C1U1
4EUEUERERER6M-4,-8M+18,+6G12U6L4
GLGLGDGD12L6":PAINT(114,90),1,1:
JK$=" THIS SIGN MEANS THAT THE R
OAD AHEAD CURVES TO THE RIGHT.":
GOSUB300
465 JK$=" YOU SHOULD REDUCE YOUR
SPEED BEFORE REACHING THE CURVE
.":GOSUB305
470 GOSUB410:DRAW"S8BM146,94C1U1
4HUHULHLHL6M+4,-8M-18,+6F12U6R4
FRFRDFD12R6":PAINT(142,90),1,1:
JK$=" THIS SIGN MEANS THAT THE R
OAD AHEAD CURVES TO THE LEFT.":G
OSUB300
475 JK$=" AGAIN YOU SHOULD REDUC
E YOUR SPEED BEFORE THE CURVE.":
GOSUB305
480 GOSUB410:DRAW"BM108,98C1NU32
RNU32RNU32BR4U4BU4U4RD4BD4D4BR4N
U12RU12NH4LH4BU4U4BU4U4LD4BD4D4B
U12BR6D12F12D8LU8H12U12LD12F12D8
BL4U4BU4U2LD2BD4D4"
485 JK$=" THIS SYMBOL MEANS THAT
A RIGHT LANE DROP LIES AHEAD.":
GOSUB315
490 JK$=" TRAFFIC TO THE RIGHT M
UST MERGE WITH THE LEFT LANE.":G
OSUB300
495 GOSUB410:DRAW"BM152,98C1NU32
LNU32LNU32BL4U4BU4U4LD4BD4D4BL4N
U12LU12NE4RE4BU4U4BU4U4RD4BD4D4B
U12BL6D12G12D8RU8E12U12RD12G12D8
BR4U4BU4U2RD2BD4D4"
500 JK$=" THIS SYMBOL MEANS THAT
A LEFT LANE DROP LIES AHEAD.":G
OSUB310
505 JK$=" TRAFFIC TO THE LEFT MU
ST MERGE WITH THE RIGHT LANE.":G
OSUB315
510 PCLS4
515 CIRCLE(128,58),68,1,.9:PAINT
(128,10),1,1
520 FORI=0TO128STEP4:PUT(0,I)-(2
56,I+3),A,OR:NEXT
525 CIRCLE(128,58),62,1,.9:CIRCL
E(130,58),62,1,.9
530 DRAW"S4BM128,52C1NE36NH36BD1
6NF36NG36BU8BR8NE36NF36BL16NH36N
G36":PAINT(128,58),1,1
535 DRAW"S12BM80,70U8R4D4L4F4RNH
4BR23U8R4D4L4F4RNH4"

```

```

540 JK$=" THIS SIGN MEANS A RAIL
ROAD CROSSING IS JUST AHEAD.":GO
SUB305
545 JK$=" YOU MUST STOP AND LOOK
BOTH WAYS BEFORE CROSSING.":GOS
UB310
550 JK$=" YOU MUST NEVER CROSS T
HE TRACKS IF THE GATES ARE DOWN.
":GOSUB300
555 GOSUB560:GOTO565
560 PCLS4:DRAW"S8C1BM128,0R30F2D
64G2L60H2U64E2R30BD2R28F2D60G2L5
6H2U60E2R28":RETURN
565 JK$=" REGULATORY SIGNS ALWAY
S HAVE FOUR SIDES AND ARE WHITE.
":GOSUB300
570 DRAW"BM78,100S8C1"+L$(19)+L$
(16)+L$(5)+L$(5)+L$(4):DRAW"BM78
,126"+L$(12)+L$(9)+L$(13)+L$(9)+
L$(20):FORI=78TO132STEP54:DRAW"S
4BM"+STR$(I)+",70R40E4U20H4L36U2
0R36U4L40D28R36F4D12G4L36D4":NEX
T
575 PAINT(80,68),1,1:PAINT(134,6
8),1,1:JK$=" SPEED LIMIT SIGNS A
RE EXAMPLES OF REGULATORY SIGNS.
":GOSUB315
580 JK$=" THEY SHOW THE FASTEST
SPEED WHICH YOU MAY TRAVEL.":GOS
UB300
585 GOSUB560:DRAW"BM106,40S8C1"+
L$(14)+L$(15):DRAW"BM88,74"+L$(1
2)+L$(5)+L$(6)+L$(20):DRAW"BM78,
110"+L$(20)+L$(21)+L$(18)+L$(14)
590 JK$=" OTHER TIMES THEY MAY H
AVE WRITTEN DIRECTIONS.":GOSUB31
5
595 PCLS4:COLOR2,3:LINE(0,0)-(25
6,92),PSET,BF:B=16:A=0:CL=1:JK$="
" BY KNOWING THE SHAPES OF TRAFFI
C SIGNS, YOU CAN SAVE TIME IN K
NOWING THE ROAD RULES IN JUST A
SPLIT SECOND.":GOSUB135:PCOPY3TO
1:PCOPY4TO2:GOSUB200
600 COLOR3,2:LINE(0,98)-(256,192
),PSET,BF:A=0:CL=1:JK$=" INFORMA
TION SUCH AS THIS COULD SAVE YOU
R LIFE, OR THE LIFE OF A LOVED O
NE. KNOWLEDGE IS SAFETY WHEN DRI
VING.":GOSUB135:PCOPY3TO1:PCOPY4
TO2:GOSUB200
605 IFINKEY$<>CHR$(13)THEN605
610 RUN

```



Photographing a CRT Screen

By Marty Goodman and Fred Cisin

It is relatively easy to get nice *hard copies* (printouts) of one's black-and-white drawings done on a computer. Screen dumps to dot matrix printers produce quite excellent copy in most cases, but getting hard copies of color images is considerably more difficult.

Black-and-white dot matrix printers are very common and can be had for relatively low cost. And if one buys a printer that is Epson compatible, one can be assured that all common graphic screen dumps will work reasonably well with it.

Color printers are expensive, available in only a few models, and extremely slow. Worse yet, *no* color printer available for under \$1,000 can be made to display the full 64-color palette of the CoCo 3 (or even all of the nuances of artifact color patterns of the CoCo 2) even with the best of screen dump programs. For the present, the only

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Fred Cisin is formally trained in Computer Sciences and photography. He created the company Xenosoft, which produces Xenocopy (a file conversion program for alien file formats) and Xenofont (a screen capture and print package) for the IBM PC. Fred is also on the faculty of Merit College, where he teaches Computer Sciences.

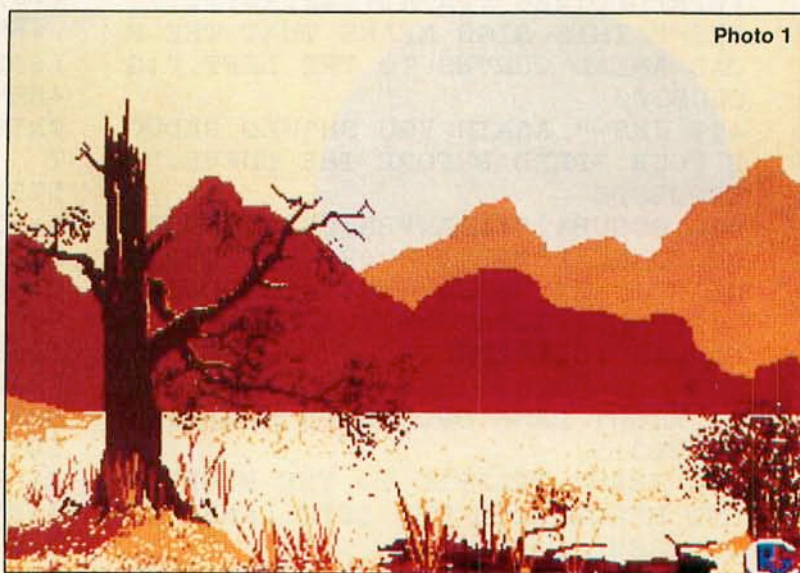


Photo 1



Photo 2

Photo 1: This desert scene photo shows a proper exposure. 1s @ f8, 100mm. **Photo 2:** This photo was taken with a shutter speed of 1/125th second (f2.0). In addition to showing the normal effects of too high a shutter speed, the photo shows the artifact of the focal-plane shutter mechanism (diagonal shadow).



Photo 3



Photo 4



Photo 5

Photo 3: A proper exposure taken at 1s, f5.6 with a 100mm lens. **Photo 4:** This image has been marred by the glare and reflection of a desk lamp. The glare, however, is not always so obvious. Sometimes it appears as uneven shadowing which makes the picture look as though you are viewing it through shallow water. 1s @ f5.6, 100mm. **Photo 5:** This photo, taken with a 28mm lens, shows the effects of fish-eye distortion. 1/4s @ f5.6. Tight cropping, however, almost eliminates this distortion.

means of getting accurate hard copy of color art is photographing the color monitor displaying the picture.

This article is addressed primarily to owners of 35mm single-lens reflex cameras. A camera that allows some degree of manual control is required. You will not be able to use the "program" mode of the newest, highly automatic 35mm SLR cameras. Instead, you will be using either a shutter speed or aperture-preferred mode of automatic operation, or a fully manual mode. Where focal lengths of lenses are given, remember that they are for 35mm film systems. Owners of other systems will have to make appropriate adjustments. Those with Polaroid cameras allowing through-the-lens focusing will be able to make use of much of the advice here, but will need some means of exposure control — possibly via filters that cut down light entering the camera. We will also briefly discuss the techniques used for ultra-high resolution transfer of computer images to film, such as those used in movie production studios.

How To Do It

There are several elements of successfully photographing a monitor: exposure, focus, focal length and anti-stray light measures used. The exposure itself can be broken down into contributing factors of shutter speed, film speed and aperture.

Shutter Speed

In photographing a monitor you must use a relatively long shutter speed. We recommend using a speed of between a quarter of a second and two seconds. Why?

Pictures are drawn a line at a time on the screen of a monitor. As an electron beam traces across the screen, the beam's intensity is varied. Accordingly,

the brightness with which the phosphor lights up on the screen where the beam hits varies. On most monitors a picture is traced in 1/16th of a second.

The instant after a bit of phosphor is excited by the beam it begins to fade. On some monitors this fading occurs rapidly and on others it is a bit slower. This is referred to as short vs. long persistence phosphor. You may have noticed on some green monochrome monitors that when the screen is cleared, the ghost of the previously displayed image remains for a moment. On most monochrome amber screen monitors this does not happen, because the most commonly used green phosphor tends to be a bit longer in its persistence than the most commonly used amber phosphor. Very short persistence phosphors fade so rapidly that the image may appear to flicker, causing eyestrain. Very long persistence phosphors cause annoying ghosting when their display is changing rapidly.

Let's see what happens if we try to use a 1/250th of a second shutter speed to photograph a monitor. In that time only a quarter of a full image can be traced on the monitor. Thus, what the camera will see is a quarter of the image appearing very bright, for it was just traced, and the remainder of the picture looking quite dim, for all that the camera is seeing is the fading phosphorescence of the screen from the previous trace.

What happens if you use a shutter speed of 1/30th of a second? This is roughly enough time for two pictures to be traced on the screen. The key word here is *roughly*. Only exceedingly expensive camera shutter speed settings are likely to be exact to more than + or - 20 percent. Thus, the camera will see between 1 4/5 and 2 1/5 frames traced. The result is that a narrow band on the picture will be either especially bright or especially dim, depending on which

direction the camera's shutter speed is in slight error.

The solution is to use an especially long shutter speed. If you shoot at one second exposure you will be photographing 60 full frames. Although the last of those frames will be cut off at some random point, the inequality in exposure for that part of the film will be only 1/60th of the total exposure, so no bright or dark bands will be seen in the picture.

The use of so long an exposure also eliminates the distortions caused by the operation of focal plane shutters. Note that in order to take a proper picture at this long a shutter speed, you *must* use a tripod or other solid means of anchoring the camera, and a means of tripping the shutter that will not jostle the camera. This means either using a cable release or using the self timer on the camera.

Film Speed

In order to allow use of a relatively slow shutter speed we need to use a relatively slow film speed. We recommend ASA 100 or slower. You may want to experiment with your camera's internal meter to see what sort of speed film it wants in order to take a proper picture of your monitor at the recommended slow shutter speed.

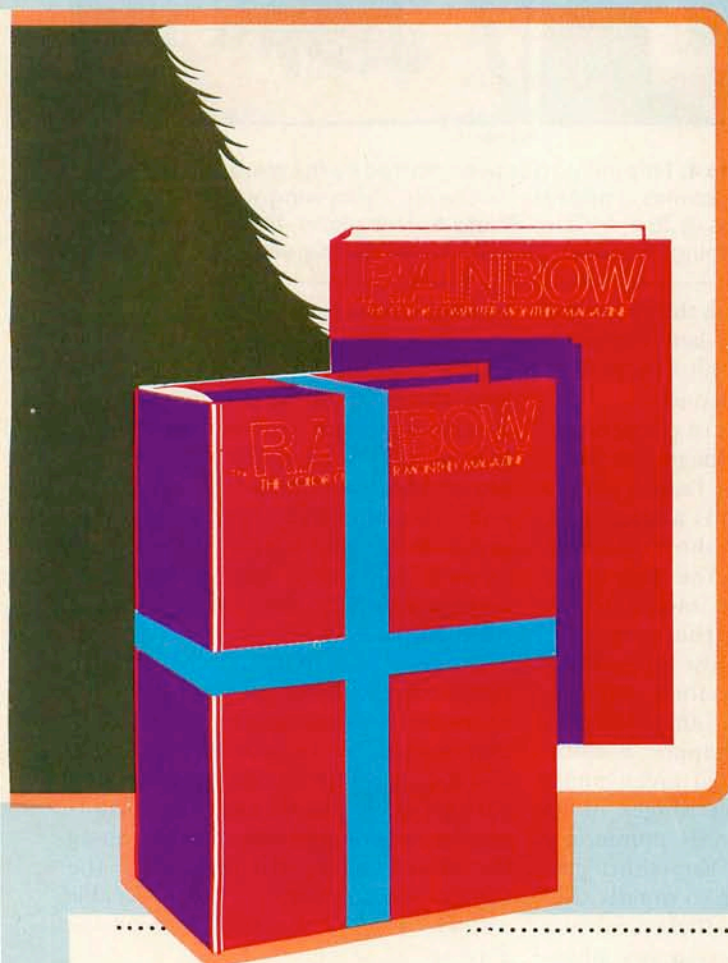
Professional photographers will be aware that shooting at shutter speeds as slow as one second slightly alters the color balance of the resulting picture. However, such "reciprocity failure," as the pros call this effect, will not be very significant, and, in any case, will affect the colors far less than variations of color display caused by the particular monitor used and by the settings of the controls on a given monitor.

Aperture

One wants to have a lot of depth of

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field. In order to get this one must use a small aperture (high f number). We recommend f5.6 or greater. You may end up choosing the precise value based on what will be said next about focusing and depth of field.

Examine the diagram (Figure 1). You will see that the distance from the center of a monitor to the camera is less than the distance from the edge of a monitor to the camera. Because of this, if you focus on the center of your monitor, the edges of the monitor may be out of focus, or vice versa. This effect is compounded by the fact that many monitors have edges that curve away from the center.

There are two simple solutions to this problem. One is to choose a sufficiently high f value (small aperture) so that the camera has great enough depth of field to get both the edge and center of the monitor in focus. Most 35mm SLR cameras have a depth of field preview option that allows viewing the image as it will be seen by the film, at the f stop that will be used to take the picture. This option is useful in confirming you have selected a sufficiently high f number opening to provide for adequate depth of field.

Note that the closer you are to the

monitor, the greater the discrepancy between camera to monitor center vs. camera to monitor edge distances. Another approach is choosing a longer focal length lens that allows shooting further from the monitor.

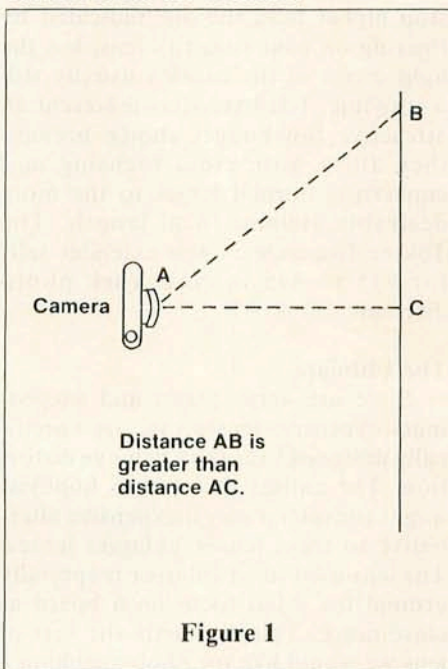


Figure 1

Focal Length

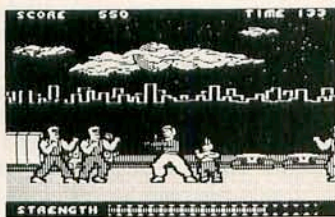
We recommend using a medium tele-

photo lens (75 to 120 mm) to photograph a monitor. While a 50mm lens will do, the problem is that in order to focus close enough to the monitor so that its screen fills the camera, you will often end up so close to it that the resulting image will show fish-eye distortion. Actually, *all* things when viewed close up necessarily show fish-eye distortion. In the human image processing system, however, complex pre-processing in the brain filters that fish-eye effect out, so we usually do not perceive images viewed close up by our eyes as having fish-eye distortion. Such image "correction" is not done within a camera. If you use a medium telephoto lens, you can get further from the monitor, and the resulting image on film will be flatter. If you use much more than a 120mm lens, you will find it difficult getting adequate depth of field and stabilizing the camera properly for the exposure. Sharpness will also suffer.

Many ordinary lenses will not be able to focus closely enough to the monitor to let the image fill the screen. The solution is to use a macro or close focusing lens. These lenses are optimized for focusing close to objects, and allow you to get within inches of your subject. Note that the newer "do every-

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thing" lenses (wide angle, telephoto, and close focusing all in one lens) may *cause problems* due to internal reflections in their numerous internal glass elements. A simple, dedicated 100mm macro lens would likely be better, for it tends to have only three to five pieces of glass in it, compared to the 13 or more in modern, multiple purpose lenses.

Two far less expensive (and nearly equally effective) alternatives to using a macro lens are to use a lens extender or a "porta" (add-on close-up lens). If using extension tubes on your 35mm camera, try to get tubes that preserve the light meter operation of the camera. Get the smallest available size extension tube. You do *not* want to use a long tube or, worse yet, an extension bellows. They are for postage stamps and insects. The #2 porta lens is likely to be the right one for you.

You may want to experiment in the store before deciding on what porta lens or extension tube to buy. Take along a piece of cardboard the size of your monitor screen to facilitate such experimentation. Select a porta lens or extension tube that permits you to focus sharply on the "target" cardboard at a point where it just completely fills the camera's viewfinder. Porta add-on lenses cost about \$10 to \$20 and the extension tube costs about \$20 to \$30 at discount photo stores.

A third alternative, which we particularly recommend, is a tele-extender. This device is placed between your camera and your lens, and effectively doubles the focal length of the lens.

Vivitar makes the excellent 2X Macro Flat Field Tele-extender. It doubles the focal length of a lens, makes the lens field flat (valuable for photographing screens), and considerably extends how close it can focus. Tokina also makes an especially good tele-extender for most popular SLR cameras. When used with a 50mm ("normal") lens, the result is a 100mm focal length, ideal for screen photography. If your 50mm lens normally can focus to within 3 feet (one meter) of its subject (as is usually the case), then you will be able to focus close enough when using the tele-extender to allow a 14-inch diagonal monitor screen to fill the viewfinder.

Tele-extendors are also handy for use with telephoto lenses if you need to use an *extreme telephoto* lens. The drawback associated with them is that the added glass can cause internal reflections, and they do to some extent

degrade image quality. But modern, high quality tele-extendors like the Tokina five-element model offer quite good optical performance.

Note that using a tele-extender will cause the actual f stop you use to be one stop higher than the one indicated by the ring on your camera's lens, but the light meter in the camera usually still works fine. Tele-extendors represent an attractive low-budget choice because they allow both close focusing *and* converting normal lenses to the more desirable 100mm focal length. The Tokina five-element tele-extender sells for \$35 to \$45 in New York photo discount stores.

The Ultimate

There are very special and exceedingly expensive lenses that are specifically designed to correct fish-eye distortion. The enthusiastic photo hobbyist might consider a very inexpensive alternative to these lenses: enlarger lenses. The lens used in an enlarger is specially ground for a flat focus on a board at close range. This is exactly the sort of lens we would like for photographing a monitor in a distortion-free fashion. If you are competent to mount such a lens on your camera, you will have an inexpensive ideal lens for photographing monitors. Of course, you will have to give up all aspects of automatic opera-

tion of your camera if you try this approach.

Stray Light Prevention

When you look at a monitor, you usually don't notice the mild to moderate amount of glare and reflections present from the monitor's surface. The camera will see all of this, though, and your first attempts at photographing a monitor might be quite disastrous, for the image could be virtually lost in a sea of reflected images from around the room.

To prevent stray light, you must photograph the monitor in a darkened room. Preferably, you should put the camera and monitor under a black cloth or conical black cardboard hood to completely eliminate stray light and reflected room images. Even so, you still can have problems with reflection of the lens of the camera. We recommend, if you are quite serious about this, that you black out with a felt tip pen or paint the white lettering that surrounds your camera's lens. The lettering has been known to cause visible reflections in screen photos.

Color Balance and Phosphor Dots

Most color monitors have images that are somewhat bluish overall. We tend not to notice this when viewing the monitor, for we automatically correct

Hi-Res Color and Animation

When folks want extremely high resolution color images on film, it turns out that color monitors are often *not* used. This is because ultra Hi-Res color monitors are exceedingly difficult to make, costing tens of thousands of dollars. Their resolution is limited by the fineness of the phosphor dots on them and by the precision of the positioning of the shadow mask grid.

A far simpler technique is to use a high resolution black-and-white monitor. Today, black-and-white monitors with resolutions in the 1,000-by-1,000 pixel range and better can be had off the shelf for under \$1,000. These are combined with a driver program and driver hardware capable of displaying a large number of gray levels for each pixel. A given image is created using three monochrome pictures, each showing the red, green and blue information in that image. These three components are then photographed using color film and red, green and blue filters. In effect, you get the immense resolution of monochrome with the beauty of color. If each pixel can be shown at one of 64 gray levels, 64 cubed (over a quarter of a million) different colors can be resolved. If the system can display 256 gray levels, then

it can resolve over 16 million colors. Registration of the three color images must be perfect, of course. But this is a practical technique that is very commonly used for ultra high resolution color imaging.

Equipment designed for frequent and professional creation of film images from computer images incorporates a number of niceties. The shutter on the camera can be electronically synchronized to the video display, so that there no longer is a need for a very long shutter speed.

For computer graphics used in animated movies, each frame is made one at a time. Indeed, in some cases it takes minutes to hours of time on immense Cray computers to calculate the changes needed for each frame. Thus, those animated sequences are no more produced in "real time" on the computer than were their predecessors that were exclusively drawn by human hand.

After each new frame is ready, it is converted to a film image. Recall, too, that monitors typically display 60 frames a second, but movie film is set up to run at 24 frames per second. Thus, if one merely points a movie camera at a monitor, trying to record a real-time moving image on it, the results will be disappointing. □

for it. But photos of color monitors may appear bluish. Ektachrome film is most likely to have this problem, for it tends to yield slightly bluish pictures to begin with. We suggest using Kodacolor (print) or Kodachrome (slide) film. If you still find your pictures appearing unacceptably bluish in areas that should be white, you might want to experiment with using filters on your camera to correct this. Slight bluishness might be corrected by a skylight (1A) filter. FLD filters, used to correct for fluorescent lighting, might be of help with more severe bluish cast problems.

Of course, it is quite possible to make needed color corrections when the negative is developed and printed, in the darkroom. One merely experiments with various filters until a part of the image that is supposed to be white is indeed properly rendered as white. But if you want this done for you by a professional printing service, you will find such custom corrections cost a great deal. Unless you do your own color printing, you will find it far less expensive to attempt to make any needed corrections by using a filter on the camera at the time you take the picture.

If you focus sharply on the monitor, you might find that your photos show the individual phosphor dots that compose the face of a color monitor. This effect can be either pleasing or annoying, depending on the image in question. To eliminate this effect, you may wish to deliberately make the image just slightly out of focus. This can be done at the time you take the picture, or at the time the picture is printed. Professionally, it is best to take a sharp picture and then, if need be, put it out of focus at the time of printing. But as with the filters, unless you do your own printing, you may find it economical to make the camera out of focus at the time the picture is taken. We recommend that you also take a similar picture in sharp focus at the same time.

In the case of screen photos that are published in magazines, a very sharp image showing the phosphor dots on the monitor can cause Moire patterns when the pattern of dots on the monitor photo interacts with the pattern of dots used to render the color picture in the magazine printing process. It is for this reason that photos for publication in RAINBOW are often deliberately put very slightly out of focus, to eliminate the dot

pattern of the monitor screen from the photo image.

Summary

For proper screen photography, we recommend:

- 1) shutter speed of 1/2 to 2 seconds
- 2) small aperture (f5.6 or higher)
- 3) a close focusing, moderate telephoto lens
- 4) a hood to keep out stray light

If you follow this advice, you should be able to take quite excellent, nearly professional, color or black-and-white pictures of your monitors. If you find there is undesirable fish-eye distortion, and if you are a photo hobbyist, do consider adapting an enlarger lens to your camera. Using one will likely give you truly professional quality screen photos.

In the examples we show photos of a monitor where all of the important details are taken care of. We also show photos where the shutter speed is too short for a proper image, where the image is marred by glare, and where annoying fish-eye distortion (due to deliberate use of a wide angle lens) is present.

MLBASIC 2.0 - BASIC Compiler

The wait is over. WASATCHWARE announces the latest version of MLBASIC designed to allow more compatibility with existing BASIC programs than ever available before for the Color Computer. This version also allows full use of the capabilities and memory of the CoCo 3. Written in machine language, MLBASIC can compile programs as large as 64K bytes. Standard floating point (9 digit precision), INTEGER, and String type variables and arrays supported.

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FILES GET INPUT KILL LSET OPEN PRINT PUT
RSET USING LINEINPUT
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CALL DEFUSR END EXEC FOR NEXT GOSUB GOTO
IF THEN ELSE ERROR ON RETURN STOP USR
3. Functions
ABS ASC ATN COS CVN EOF EXP FIX
HPOINT INSTR INT LEN LOG LPEEK LOC LOF
PEEK POINT PPOINT RND SGN SIN SQR TAN
TIMER VAL VARPTR
4. String functions
CHR\$ INKEY\$ LEFT\$ MID\$ MKN\$ RIGHT\$ STR\$ STRING\$
5. Graphic/Screen commands
ATTR COLOR CLS CIRCLE DRAW HCOLOR HSCREEN HDRAW
HLINE HPAINT HPRINT HRESET HCIRCLE HCLS HSET JOYSTK
LINE LOCATE PALETTE PAINT PCLEAR PCLS PLAY PMODE
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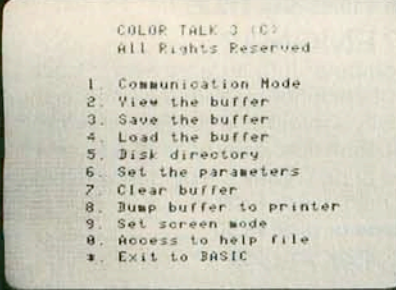
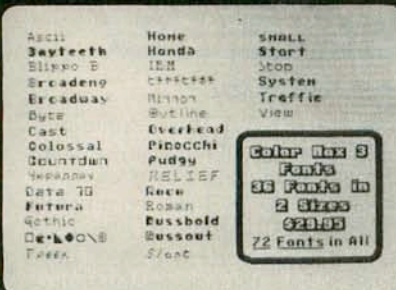
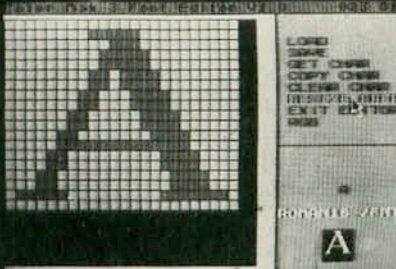
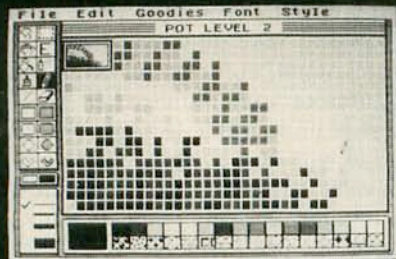
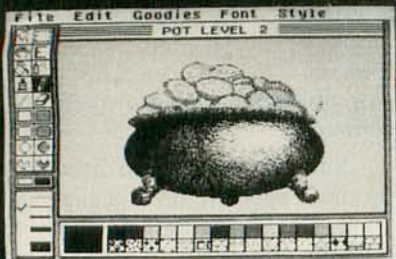
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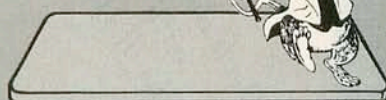
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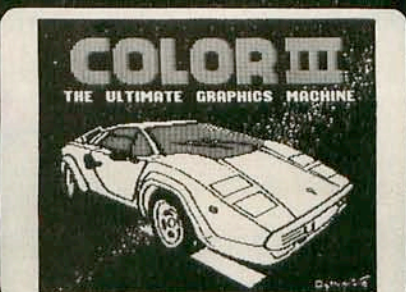
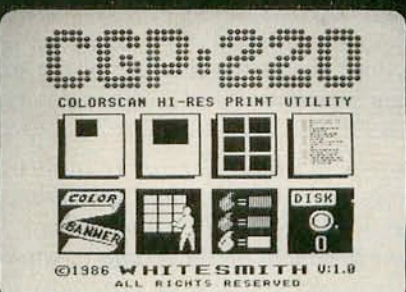
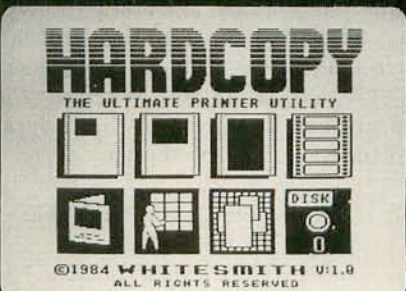
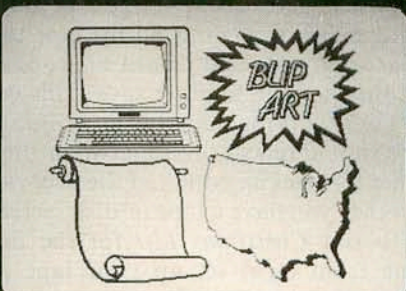
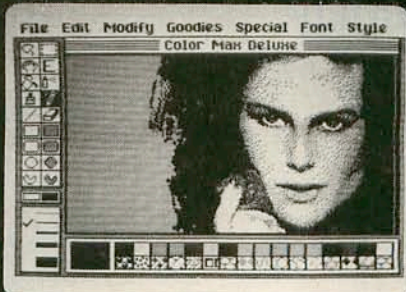
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File away important information

Making a Christmas Address List

By G.F. Saunderson

Christmas List is a BASIC program that will keep a file of names and addresses for any purpose, but it is intended for Christmas cards.

Type in and save XMASLIST. If you're using a tape system, wind the tape to a clear spot, note and record the counter reading, and do another save. This will be your working copy of the program. You should repeat this step two or three times for backup copies of the program whether you have a tape or disk system.

To run *Christmas List* for the first time from tape, set up your tape recorder by winding the tape until the counter is reading a few digits before your working copy of the program. Then load the program with the CLOAD "XMASLIST" command. When the tape has finished loading, run the program and the menu will be shown:

```
E - EDIT (CHECK/CHANGE/ADD OR  
DELETE) NAMESETS  
G - GENERATE LIST OF NAMESETS  
P - PRINT LIST  
Q - QUIT PROGRAM
```

Since this is the first use of the program, you must select G. When you type

George F. Saunderson is a retired professional engineer and project manager who lives in Houston, Texas. He is the president of TASC and co-author of two plane geometry programs distributed by TASC. His other interests include ham radio and photography.

in G you will be asked for an eight-letter name for the list. Type in something like MYLISTB7 and press ENTER. You will be asked to enter the first name of your list. When prompted, enter the street address, the city, the state and the ZIP code. You will then be asked if you want

to enter another name and address. If you answer yes, the input process is repeated. If you answer no, the program proceeds to save the list. Be sure you have a data tape or disk ready before typing No.



JOHN DOE
1234 ANYSTREET
DOWNTOWN, IN
56789

JIMMY VALENTINE
67 BELLVIEW
NEW HAMMER, ONTARIO
CANADA 374 9X3

RAINBOW MAG. - EDITOR
P.O. BOX 385
PROSPECT, KY
40059

When entering data, keep each line to 35 characters or less, and do not use commas in any line. If you must use a delimiting mark, use a hyphen.

If your address uses "c/o" it must be worked into the name line or into the street address line, or both.

The ZIP code line may be expanded for foreign countries if necessary, e.g., Canada H2A 3C4.

Once a list has been filed on tape or disk, it may be edited. If you select E from the menu, you are asked for the name of the file you want to edit, and

instructions are given on loading the list from your data tape. When loading is complete, the first nameset will be displayed with the notation:

<O> THIS IS OK
<C> THIS NEEDS CHANGING
<D> DELETE THIS NAMESET

If you type O the next nameset will be shown. If you type C you will be asked to input new data. After the new data has been entered, the next nameset will be shown.

If you type D the current nameset will be deleted. The numbers of all succeeding namesets will be decreased by 1. If you delete the first nameset of a long list, this renumbering step can take an appreciable amount of time.

When you reach the end of the list, you will be asked if you want to add a new nameset. If Y is selected you will be asked to input the data. If N is selected, prepare your data tape or disk for the corrected list to be saved.

If you want to make a backup copy of your list, you may do so by editing the list — typing in E and answering all namesets with O (and then allowing the backup to be saved at a new location on

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the data tape, if you're using a tape system).

The list may be printed by selecting P from the menu. You will be asked for the name of the file and given instructions on loading the list. After you load it, the printer will print the first nameset and show the message PRINTING-xxxxxxx, where xxxxxx is the nameset name. The screen prompts you for the next nameset. Pressing ENTER causes the next nameset to be displayed on the screen and printed. This continues until the entire list has been printed.

The printing function was designed to print tractor feed labels, single width, 1-by-3½ inches. The printing process

was designed not to be continuous — envelopes can be fed through a friction feed printer one at a time. The list, when printed on plain paper, is a good record.

The program may be changed for use with disk storage by changing the following lines:

```
200 OPEN"O",1,L$:PRINT#1,N
210 FOR A=1 TO N:PRINT#1,N$(A);"
    ";A$(A);";C$(A);";S$(A);";
    ;Z$(A):NEXT A:GOTO 60
230 CLS:OPEN"I",1,L$:INPUT#1,N
320 PRINT:PRINT"NAME OF FILE TO
    EDIT":INPUT L$:OPEN"I",1,L$
330 INPUT#1,N
340 FOR A=1 TO N:IF EOF(1) THEN
```

```
GOTO 420 ELSE INPUT #1, N$(A), A
$(A), C$(A), S$(A), Z$(A)
```

```
450 OPEN"O",1,L$:PRINT#1,N:FOR A
=1 TO N:PRINT#1,N$(A);";A$(A);
";C$(A);";S$(A);";Z$(A)
```

The disk version of the program skips all of the loading instructions. It is assumed the disk containing the program will have room for data files.

The data files will hold a list of 100 namesets. It is better not to use this capacity. Four data files of 25 namesets each are easier to edit.

(Questions may be directed to the author by calling 413-781-8984 or writing 10619 Bayou Glen, Houston, TX 77042. Please enclose an SASE when writing for a reply.) □

✓	140 .....136	460 .....103
	230 .....240	END .....176
	350 .....121	

The listing: XMASLIST

```
10 REM ***XMAS CARD LABEL PRINT
   ING PROGRAM - TAPE VERSION ***
20 REM ***TITLE "XMASLIST/TAP" *
   **
30 REM *** (C) BY GEORGE SAUNDER
   SON - HOUSTON, TX 1987 ***
40 CLEAR 10000:DIM N$(100), A$(1
   00), C$(100), S$(100), Z$(100)
60 CLS:CLOSE:PRINT"
   MENU":PRINT"====
   ="
70 PRINT" E - EDIT (CHECK/CHANGE
   /ADD OR DELETE) NAMESETS":
   PRINT" G - GENERATE LIST OF NAME
   SETS":PRINT" P - PRINT LIST":PRI
   NT" Q - QUIT PROGRAM":PRINT:PRIN
   T" PRESS KEY OF YOUR CHOICE"
80 X$=INKEY$:IF X$="E" THEN GOTO
   320
90 IF X$="G" THEN X$="":L$="":N=
   0:GOTO 130
100 IF X$="P" THEN X$="":GOTO 22
   0
110 IF X$="Q" THEN X$="":GOTO 31
   0
120 IF X$<>"G" OR X$<>"P" OR X$<
   >"Q" THEN GOTO 80
130 PRINT:PRINT"8-LETTER NAME OF
   THIS LIST ":INPUT L$
140 CLS:N=N+1:PRINT"NAME":INPUT
   N$(N):PRINT"STREET ADDRESS":INPU
   T A$(N):PRINT"CITY":INPUT C$(N):
   PRINT"STATE":INPUT S$(N):PRINT"Z
   IP CODE":INPUT Z$(N)
```

```
150 PRINT:PRINT"ANOTHER NAME & A
   DDRESS? <Y> OR <N> PRESS
   KEY"
160 X$=INKEY$
170 IF X$="Y" THEN X$="":GOTO 14
   0
180 IF X$="N" THEN X$="":GOTO 200
190 IF X$<>"Y" OR X$<>"N" THEN G
   OTO 160
200 CLS:PRINT"WIND DATA TAPE TO
   FRESH TAPE- NOTE COUNTER READI
   NG":PRINT"SET RECORDER TO RECORD
   ":GOSUB 540:CLS:PRINT"RECORDING
   ";L$:OPEN"O",#-1,L$:PRINT#-1,N
   210 FOR A=1 TO N:PRINT#-1,N$(A);
   A$(A);C$(A);S$(A);Z$(A):NEXT A:G
   OTO 60
220 PRINT:PRINT"FILENAME OF CARD
   LIST TO BE PRINTED":INPUT L
   $
230 CLS:PRINT"SET DATA TAPE TO B
   EGINNING OF ":PRINT L$:PRINT"SET
   RECORDER TO PLAY":GOSUB 540:CLS
   :PRINT"PRINTING ";L$:OPEN"I",#-1
   ,L$:INPUT#-1,N
240 FOR A=1 TO N
250 INPUT#-1, N$(A),A$(A),C$(A),
   S$(A),Z$(A)
260 PRINT:PRINT"PRINTING ";N$(A)
270 PRINT#-2:PRINT#-2,N$(A):PRIN
   T#-2,A$(A):PRINT#-2,C$(A):PRINT
   #-2," ";PRINT#-2,S$(A):PRINT#-
   2,Z$(A):PRINT#-2
280 PRINT:PRINT"PRESS <ENTER> FO
   R NEXT LABEL":INPUT Z
290 NEXT A
300 PRINT:PRINT"END OF FILE - <E
   NTER> FOR MENU":INPUT Z:GOTO 60
310 PRINT:PRINT"THAT'S ALL FOLKS
   !! !":END
320 PRINT:PRINT"NAME OF FILE TO
```



```

EDIT":INPUT L$:CLS:PRINT"SET DAT
A TAPE TO BEGINNING OF ":PRINT L
$:PRINT"SET RECORDER TO PLAY":GO
SUB 540:OPEN"I",#-1,L$
330 INPUT#-1,N
340 FOR A=1 TO N:IF EOF(-1) THEN
GOTO 420 ELSE INPUT #-1, N$(A),
A$(A), C$(A), S$(A), Z$(A)
350 CLS:PRINT:PRINT L$;" N
AMESET NO. ";A:PRINT
360 PRINT N$(A):PRINT A$(A):PRIN
T C$(A);", "; S$(A):PRINT Z$(A)
370 PRINT:PRINT" <O> THIS IS OK"
:PRINT" <C> THIS NEEDS CHANGING"
:PRINT" <D> DELETE THIS NAMESET"
380 X$=INKEY$:IF X$="O" THEN X$=
"":GOTO 410
390 IF X$="C" THEN X$="": GOTO 4
30
395 IF X$="D" THEN GOTO 530
400 IF X$<>"O"OR X$<>"C" OR X$<>
"D" THEN GOTO 380
410 IF A=N THEN GOTO 470 ELSE NE
XT A
420 GOSUB 540:CLOSE:GOTO 450
430 PRINT:PRINT"NAME":INPUT N$(A
):PRINT"STREET ADDRESS":INPUT A$
(A):PRINT"CITY":INPUT C$(A):PRIN
T"STATE":INPUT S$(A):PRINT"ZIP C

```

```

ODE":INPUT Z$(A)
440 NEXT A
450 CLS:PRINT"WIND DATA TAPE TO
FRESH TAPE- NOTE COUNTER READI
NG":PRINT"SET RECORDER TO RECORD
":GOSUB 540:CLS:PRINT"RECORDING
";L$:OPEN"O",#-1,L$:PRINT#-1,N:F
OR A=1 TO N:PRINT#-1,N$(A);A$(A)
;C$(A);S$(A);Z$(A)
460 NEXT A:CLS:GOTO 60
470 PRINT:PRINT"ADD A NEW NAMESE
T? <Y> OR <N>"
480 X$=INKEY$:IF X$="N"THEN CLS:
GOTO 420
490 IF X$="Y"THEN GOTO 510
500 IF X$<>"Y"OR X$<>"N" THEN GO
TO 480
510 N=N+1:CLS:PRINT"NAME":INPUT
N$(N):PRINT"STREET ADDRESS":INPU
T A$(N):PRINT"CITY":INPUT C$(N):
PRINT"STATE":INPUT S$(N):PRINT"Z
IP CODE":INPUT Z$(N)
520 CLS:GOTO 470
530 FOR B=A TO N:N$(B)=N$(A+1):A
$(B)=A$(A+1):C$(B)=C$(A+1):S$(B)
=S$(A+1):Z$(B)=Z$(A+1):NEXT B:A=
A-1:N=N-1:NEXT A
540 PRINT@452,"PRESS <ENTER> TO
CONTINUE";:LINEINPUT Z$:RETURN

```

**"I cannot imagine the CoCo 3 without ADOS-3;
it would not be a complete machine."**

The RAINBOW, July 1987

You've moved up to a CoCo 3. A powerful new machine. Now, it's time to give BASIC a shot in the arm, with ADOS-3. Wouldn't it be nice to turn on your machine and be greeted by an 80-column display, in the colors of your choice, with your own custom startup message? To run routinely at 2 MHz (double speed) without having to slow down for disk and printer operations? This and much, much more is possible with ADOS-3, our CoCo 3 adaptation of the acclaimed original ADOS, which shares the original's virtual 100% compatibility with commercial software. After customizing ADOS-3 using the provided configuring utility, you can have it burned into an EPROM that plugs into the Disk BASIC ROM socket, or just use it in RAM as a disk utility. (EPROM + burning will cost \$45-20; we provide information concerning how you can have this done.) Supports double-sided drives (35, 40, or 80 tracks). FAST and SLOW commands, auto line number prompts, RUN command, keystroke macros, arrow-key scroll through BASIC programs, auto-edit of error line, and many more valuable features.

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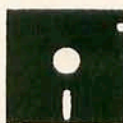
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NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.



Winter Carnival

Holiday Graphics

The Christmas Star

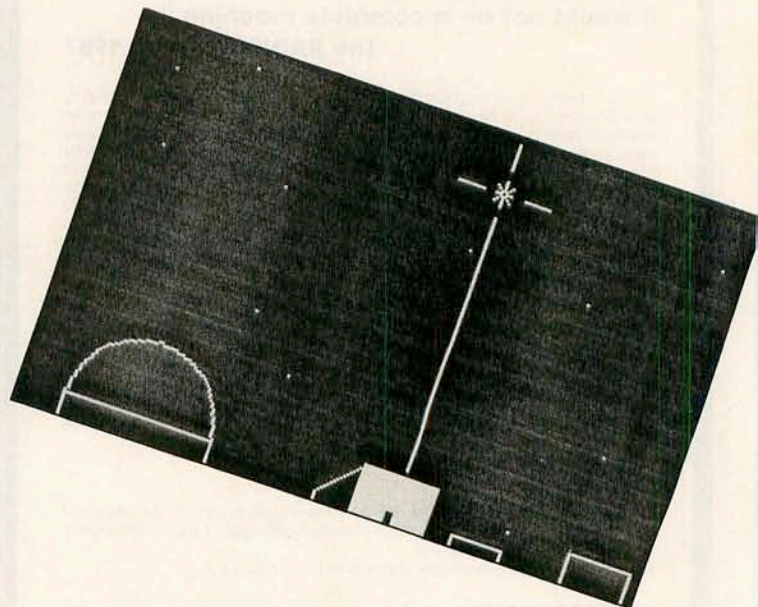
By Don Shortt and M.G. Duncan

16K
ECB

We don't know whether the Christmas Star was a supernova explosion or an alignment of planets or something else entirely. But you can enjoy this transformation of a tiny star making its way to a point in the sky over a certain stable in Bethlehem.

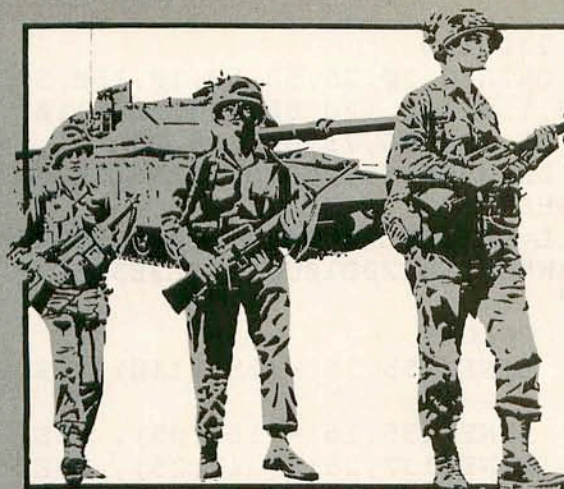
The listing: XMASSTAR

```
10 *****
20 '   A CHRISTMAS CARD
   FROM M.G.DUNCAN AND
   DON SHORTT  1986
30 *****
40 DIMA(12),B(12)
50 PMODE4,1
60 SCREEN1,1
70 PCLS0
80 LINE(0,164)-(256,164), PSET
90 DRAW"BM124,164U5E15D19U20R30
```



```
D21L13U7L4D7"
```

```
100 LINE(180,164)-(200,158), PS
ET,B
110 PAINT(150,163),1
120 CIRCLE(50,154),30,,1,.5,0
130 LINE(20,164)-(80,154), PSET
```

NEW

IRON CROSS

War in Russia

by John & Michael Galus

Directive No. 21

Operation Barbarossa

16 December 1940

The German forces must make preparations to crush Soviet Russia in a lightning campaign. For this purpose the Army will commit all available forces except those needed to safeguard the occupied territories against surprise attacks. The Air Force will earmark sufficient forces to support the ground operations and guarantee the rapid conclusion of this campaign.

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ADOLF HITLER

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object of IRON CROSS is to defeat the Russian forces controlled by the computer & to take control of the Russian cities.

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CoCo III with everybody's favorite drawing package. It includes spectacular features like zoom, color mixing, animation, color sequencing, slide show, special effects, and more. Plus everything is included — the hires interface for your mouse or joystick, printer drivers, utilities (including conversion from CoCo Max II), and a detailed manual. (Requires CoCo III, disk, & joystick or mouse.)

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modem communication software
by BJ Chambless

Color Connection for RSDOS and OS-9 Connection are the best in communication software. All standard protocols are supported, including CompuServe Protocol B, XMODEM, and XON/XOFF. The auto dial feature for Hayes compatible and some Radio Shack modems is supported. Macros allow easy entry of often-used passwords and ID's. 300, 1200, and higher baud rates supported. Communicate with confidence with this super modem software!

OS-9 version requires R232 Pak

RSDOS versions (CoCo 2 & CoCo 3 incl)

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\$49.95

OS-9 Word Processing

Screen Star

by Scott Cabit

This excellent screen editor implements the popular WordStar editing capabilities on OS-9 & includes a unique Speller. Move, copy, or delete blocks of text with one keystroke. Powerful cursor commands allow fast, easy movement throughout the file. The find/replace command makes mass changes & searches a snap. Set tabs, toggle the video, access the OS-9 shell & define up to 10 function keys for fast repetitive functions. And it will edit files larger than memory tool Easy interface with Computerware's Text Formatter makes an exquisite word processing package!

Requires OS-9

\$49.95

With Text Formatter

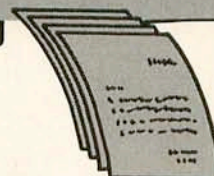
\$74.95

Text Formatter

The OS-9 Text Formatter turns text files into beautifully printed documents. It supports right & left justification, automatic pagination, headers & footers, macros, tabs, page numbering, auto date insert, ESC & CTL codes for printer directives & more. It interfaces with any editor that produces standard ASCII text files like Computerware's Screen Star & Radio Shack's TS Edit. Why just print it when you can format it!

Requires OS-9

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```
,B
140 PAINT(22,170),1
150 LINE(225,164)-(250,150), PSE
ET,B
160 FORX=1TO12: READA(X),B(X)
170 NEXT
180 REM
190 T=RND(2):P=RND(12):IFT=2THEN
PSET(A(P),B(P))
200 IFT=1 THEN PRESET(A(P),B(P))
: FORX=1TO222: NEXT: PSET(A(P),B
(P))
210 R=R+1: PSET(R,25):PRESET(R-1
,25)
220 IFR=155 THENR=154:GOSUB250:P
RESET(155,25)
```

```
230 GOTO190
240 DATA20,20,25,50,50,10,150,50
,200,150,100,120,80,100,225,110,
200,55,128,96,75,50,245,25
250 DRAW"BM155,20D10U5L3R6L3E3G6
E3F3H6"
260 L=L+1:IFL=2 THEN L=0: COLOR0
:DRAW"BM155,20D10U5L3R6L3E3G6E3F
3H6"
270 COLOR1
280 LINE(155,35)-(155,140), PSE
T
290 LINE(155,15)-(155,05), PSET
300 LINE(137,25)-(147,25), PSET
310 LINE(164,25)-(174,25), PSET
320 RETURN
```

16K
ECB

This Wreath Hangs Indoors

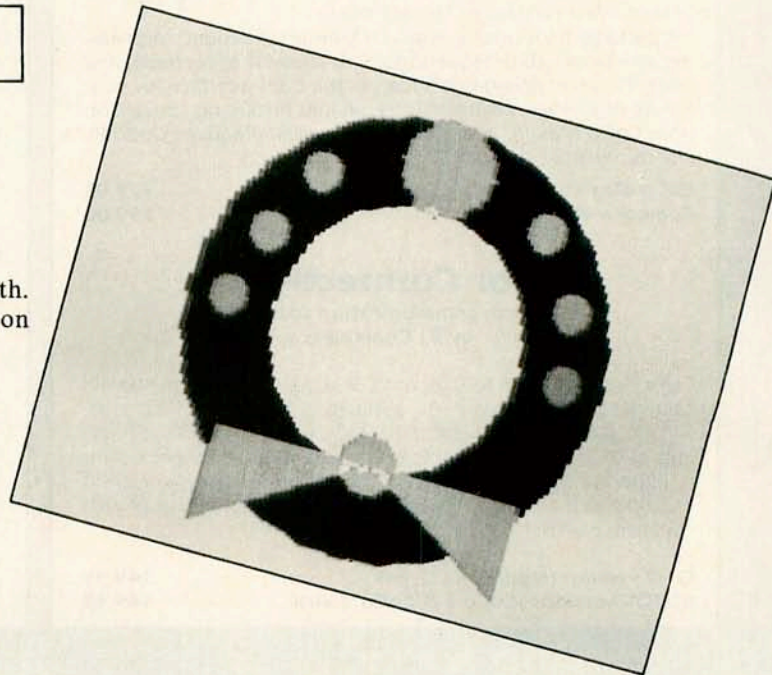
By Mark Bell

Christmas wouldn't seem like Christmas without a wreath. However, we do not suggest that you hang your monitor on your front door. Keep your CoCo close to the fireplace and think cozy holiday thoughts.

The listing: WREATH

```
5 REM**A WREATH WITH MUSIC**
10 PMODE3,1:PCLS:SCREEN1,1
20 CIRCLE(128,96),96
30 CIRCLE(128,96),58
50 CIRCLE(200,66),10
60 CIRCLE(180,36),10
70 CIRCLE(130,21),23
80 CIRCLE(76,36),10
90 CIRCLE(60,66),10
100 CIRCLE(50,96),10
110 CIRCLE(205,96),10
120 LINE(60,150)-(200,150),PSET
130 LINE(60,150)-(60,200),PSET
140 LINE(60,200)-(130,150),PSET
150 LINE(130,150)-(200,200),PSET
160 LINE(200,200)-(200,150),PSET
170 PAINT(105,17),2,4
180 PAINT(110,21),8,8
190 PAINT(76,36),8,8
200 PAINT(60,66),8,8
210 PAINT(205,96),8,8
```

```
220 PAINT(50,96),8,8
230 PAINT(200,66),8,8
250 PAINT(180,36),8,8
260 PAINT(175,50),2,4
400 CIRCLE(130,150),15
410 PAINT(125,145),8,8
420 PAINT(125,155),8,8
430 PAINT(145,155),8,8
440 PAINT(105,175),2,4
450 PAINT(80,175),8,8
460 PAINT(70,180),8,8
470 PAINT(180,150),8,8
490 PAINT(196,180),8,8
500 GOTO500
```



Data Master

from the same people who brought you Data Bank & OS-9 Profile...
a new level of sophistication and ease of use in data base systems!

by BJ Chambless

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Simplify steps with pull-down menus

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A unique *LIST* display format lets you view data in easy-to-read rows & columns. Simply choose which elements from the record you want to see and **Data Master** displays them in a simple, one record per line, spreadsheet-like format.

From this easy-to-read screen you may edit your data right there, without having to exit the display menu, enter an edit menu, and edit each individual record. Mass changes are a snap!

For even more power, use an access key to selectively display a subset of records from your data base. Now you see only the chosen elements, in the chosen records, in a very simplified screen format - and can change them right on the screen!

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Data Master can read and write standard sequential files which aids in data transfer between DynaCalc and many other programs.

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Your OS-9 Profile and Data Bank files are compatible with the new power of **Data Master**. You won't lose any of your valuable data when you step up to **Data Master**!

Easy Expansion

Re-definition of records and transfer of files is made easy, allowing you flexibility when designing a new data base or when using an old one for new tasks.

Elements & Records:

Each record can contain up to 512 characters used within 35 elements. Elements are defined as: *alphanumeric* (descriptive data), *math* (real numbers including dollars & cents), *data*, and *derived* (formulas calculated from other elements in the same record). You can store any type of data using these field types!

Display & Entry Screens

Design up to 9 different screen formats for data display and data entry for each data base. This is helpful for accessing your data for different purposes as well as in easy data entry of specific elements.

Sorts & Selections:

Up to 9 different access keys can be defined. These are used for displaying data on the screen or selecting data for printing. You may use several levels of sorts as well as logical operators to select just the right data. A powerful generic search is also available.

Reports:

See your data any way you want by designing your own reports! **Data Master** offers easy-to-use tools to design professional reports including report headings, titles, column headings, automatic page numbers, column totals, and more. Store up to 9 report formats for each data base. At print time use the powerful access keys to select the data printed on any report format.

File Management

Built-in file management capabilities allow easy file manipulation for transferring data files, renaming data files, expanding data files, and more. This integrated function is easy to use and available from the simplified pull-down menu system.

Full keyboard ease

Data Master takes full advantage of the CoCo 3's cursor and function keys.

OS-9 accessible

Even while operating within **Data Master**, you can invoke OS-9 commands.

Requires: OS-9 Level II, CoCo 3, 512K



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Color Demo

16K
ECB

All the Colors of the Rainbow

By Patrick Benway

When you run *Colorfest*, you will discover that there is not one color in nature that is not eventually generated. You may be puzzled to note that only three color statements (PCLS, SCREEN and PSET) are used to generate every color, shade, hint or hue possible. The longer you let this program run, the better it gets. Enjoy, and see how many different colors you can spot. The colors can be seen only on a TV or color composite monitor, however.

The listing: COLRFEST

```
10 REM*****
20 REM*      COLOR MY RAINBOW      *
```

```
30 REM*                  1986                  *
40 REM*      PATRICK J BENWAY                  *
50 REM*      R.R.2, BOX 116                    *
60 REM*      MANSFIELD, MO. 65704             *
70 REM*****
80 LET JJ=1
90 PCLS:PMODE4:SCREEN1,1
100 CLS:PLAY"01;L255;V31
110 A=165:B=RND(150):C=RND(255)
120 D=RND(60):IFB<80THENB=B+81
130 IFC<80THENC=C+170
140 IFD<90THEND=D+61:FORJ=1TO30
150 V=RND(3):A=A+V:B=B-V:C=C-V
160 D=D+V:IFC<2THENGOTO90
170 LINE(A,B)-(C,D),PSET,B:NEXTJ
180 A$="A;B;C;D;E;F;G;"
190 FORX=1TO10:PLAYA$:NEXTX
200 FORK=1TO5000:NEXTK
210 LET JJ=JJ+1:CLS
220 PRINT @ 263,"COLOR GRAPHIC #
"JJ:FORJ=1TO1000:NEXTJ:GOTO90
```

Utilities

16K
ECB

They Do it with Numbers

By Dick Purnell

Number Conversion saves programmers time at the scratch pad by quickly converting numbers from one number system to another. Four number systems are offered: decimal (ordinary numbers, base 10), hexadecimal (base 16), octal (base 8) and binary (base 2).

When you run the program, you are asked for "input." You choose the option number (from 1 to 4) of the number system you want to convert. Then you are asked for "output" — the number system you are converting to. Again, select an option number.

Next you are presented with your input and output choices

and a blinking cursor awaiting an input number. For example, if you had selected decimal (Option 1) for your input and hexadecimal (Option 2) for your output, you would type a number from zero to 65,535. (The range of numbers you are allowed to enter always appears under "input.") Typing a value of 500 would give you a value of 01F4.

To repeat the process for another input number, just type it and its output will appear. When entering a hexadecimal number, you must enter all four digits; use leading zeros, if necessary.

The listing: CONVERT

```
10 '      PROGRAM "NUMBER"
20 '      WRITTEN BY
30 '      RICHARD F. PURNELL
40 '      COPYRIGHT (C)
```



```

50 ' 5/5/87
60 CLS:O$="000000"
70 A$(1)="DECIMAL":A$(2)="HEXADE
C"
80 A$(3)="OCTAL":A$(4)="BINARY"
90 PRINTA$(1);"(1)":PRINTA$(2);"
(2)":PRINTA$(3);"(3)":PRINTA$(
4);"(4)"
100 INPUT"INPUT ";A
110 INPUT"OUTPUT";B
120 IFA=1ANDB=4THENC$=" 0-255"
130 IFA=1ANDB=2THENC$=" 0-65535
"
140 IFA=1ANDB=3THENC$=" 0-4095"
150 IFA=2ANDB=1THENC$=" 0000-FF
FF"
160 IFA=2ANDB=3THENC$=" 0000-0F
FF"
170 IFA=2ANDB=4THENC$=" 0000-00
FF"
180 IFA=3ANDB=1THENC$=" 0000-77
77"
190 IFA=3ANDB=2THENC$=" 0000-77
77"
200 IFA=3ANDB=4THENC$=" 0000-37
77"
210 CLS:PRINT" ";A$(A),A$(B):P
RINTC$
220 PRINT@97,"";:LINEINPUT" ";Y$
:N=VAL(Y$)

```

```

230 ON A GOTO240,390,400,470
240 ON B GOTO250,270,290,350
250 PRINT@97,"";:PRINT@1
12,N$;:IFB=1THENPRINTN
260 GOTO220
270 N$=RIGHT$("000"+HEX$(N),4)
280 GOTO250
290 N$="":FORX=0TO3
300 S=INT(2^(9-3*X))
310 D=INT(N/S)
320 N=N-D*S
330 N$=N$+CHR$(D+48)
340 NEXT:GOTO250
350 N$="":FORX=0TO7:N$(X)="0"
360 IFN=>INT(2^(7-X)) THENN$(X)="
1":N=N-INT(2^(7-X))
370 N$=N$+N$(X)
380 NEXT:GOTO250
390 T=12:U=4:GOTO410
400 T=9:U=3
410 N=0:FORX=0TO3
420 Z=ASC(RIGHT$(Y$,4-X))
430 D=Z-48
440 IFZ>60THEND=Z-55
450 N=N+D*2^(T-U*X)
460 NEXT:GOTO240
470 N=0:Y$=O$+Y$:FORX=0TO7
480 IFLEFT$(RIGHT$(Y$,8-X),1)="1
" THENN=N+2^(7-X)
490 NEXT:GOTO240

```

I/O Error Free

By Bohdan Hrycaj

Call lets you do searches for a program on tape without getting frustrating I/O errors. With *Call*, you won't have to start at the beginning of a tape or program, and you won't have to type CLOAD constantly after repeated I/O errors.

Key in the listing and make several copies. Run the program, and you should see "CALL=" on the screen. Reset the computer. Now, whenever you want to load in a BASIC program, type EXEC. When the "CALL=" prompt appears, type in the program name (you won't need to use quotes) and press ENTER. Fast forward or reverse your cassette to the approximate location of the program, press play, and the program will automatically load when found.

The only time you'll get an I/O Error is when the program is not loading properly. Trying to load a machine language program causes an FM Error.

16K

The listing: CALL

```

1 'CALL PROGRAM
2 CLEAR100,16282
3 FOR X=16282 TO 16282+97
4 READ A$
5 B=VAL("&H"+A$)
6 POKE X,B
7 NEXTX
8 EXEC 16282
9 DATA 8E,1,D1,6F,80,86,20,A7,80
,8C,1,DA,26,F9,8E,1,D2,C6,7,10
10 DATA 8E,3F,F4,A6,A0,5A,C1,0,2
7,6,AD,9F,A0,2,20,F3,5F,AD,9F,A0
11 DATA 0,27,FA,AD,9F,A0,2,81,D,
27,9,81,8,27,1B,A7,80,5C,20,E9,F
7
12 DATA 1,D1,BD,A5,86,BD,A6,81,8
1,0,26,F9,86,2,27,A,F,78,7E
13 DATA A4,A6,5A,30,1F,20,CE,7E,
A4,CD,43,41,4C,4C,3D,20,0,0

```


Preventing Program Wipeout

By Mike Speer

Have you ever saved a program under the wrong name and wiped out a day's work on another program — just before making your daily backup? To prevent these catastrophes you must never make a mistake when doing the *same* thing every day (nobody's perfect). Or you can include the short routine in your programs that *Safesave* generates.

The program generates four lines that allow you to safely save your program:

```
1 GOTO 10
2 VERIFYON:SAVE "filename":STOP
3 VERIFYON:SAVE "filename:1":STOP
10 '
```

At the end of your program, add the statement GOTO 2 or GOTO 3 (depending on which drive you want to save to — you can change the drive number in Line 3 to another drive if you want). For instance, typing 40000 GOTO 2 would ensure that the program is saved. Run the program when you are ready to quit and it updates itself.

Running *Safesave* creates those first four lines at the beginning of a new program. If you want to use *Safesave* in another program, make sure there is room for lines 1 through 10, or put them elsewhere in the program.

The listing: SAFESAVE

```
1 CLS:Q$=CHR$(34):OPEN"O",1,"NEW
.DAT":PRINT#1,"1GOTO10":LINEINPU
T"ENTER PROGRAM NAME: ";N$:PRINT
#1,"2VERIFYON:SAVE";Q$;N$;Q$;":S
TOP":PRINT#1,"3VERIFYON:SAVE";Q$
;N$;":1";Q$;":STOP":
2 PRINT#1,"10'":CLOSE:MERGE"NEW.
DAT"
```

Home Help

Stitch Niche-ery

By George R. Furman

Embroidery generates symmetric patterns on your screen that can be dumped to the printer to serve as a basis for embroidery and other decorative patterns.

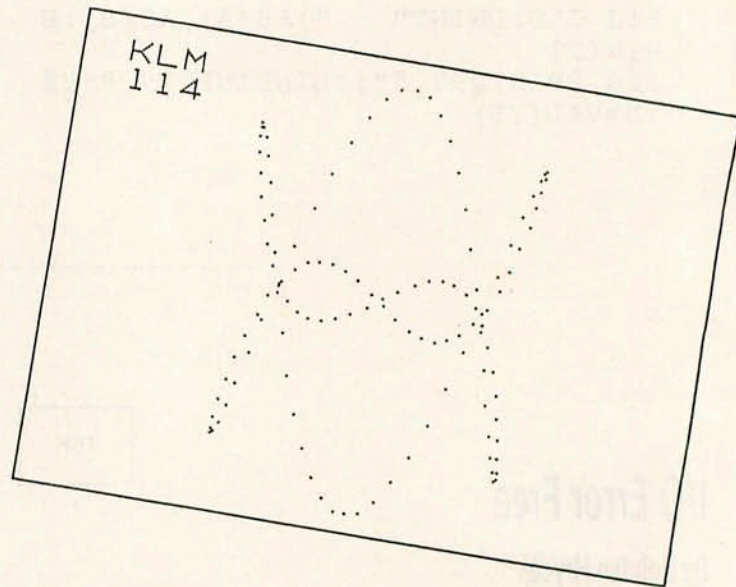
When the constants K, L and M on lines 130 to 150 are all equal, a circle is formed. Variations are controlled by changing the magnitudes of the radius (constant K on Line 450) and the horizontal (x) and vertical (y) coordinates influenced by L and M in lines 460 and 470. K, L and M can be increased to almost any limit beyond six; however, the resulting patterns take a long time to draw on the monitor and are too complex. Furthermore, exact multiples can become repetitious: 111, 222, 333, etc., all create a simple circle.

The multiplier constant 94 in Line 450 controls the overall size of the patterns. Reducing this makes the pattern smaller, but anything much larger won't fit on the screen. For tighter patterns (points closer together), the STEP value of .05 in Line 440 can be reduced to as small as .002.

The screen shows the values of K, L and M along with the specific image, making it easy to study the relationships of those factors. If you should want to return to a particular pattern, KLM=341, for example, reenter lines 130 to 150 as 130 K=3, 140 L=4, 150 M=1 and add 505 GOTO 505. In some instances a half-developed pattern can be of interest — such as patterns 136 and 165. These can be gotten by changing the limit in Line 440 to one pi (3.1416) instead of two pi.

The listing: EMBROID

```
10 ' * * * * *
20 ' * EMBROIDERY *
```



```
30 ' * BY *
40 ' * GEORGE R FURMAN *
50 ' * P.O.BOX 506 *
60 ' * GLENHAM,N.Y.12527 *
70 ' * * * * *
80 '
90 '
100 'TAPE TITLE: "EMBROID"
110 '
120 PMODE 4,1:PCLS:SCREEN 1,1
130 FOR K= 1 TO 6
140 FOR L= 1 TO 6
150 FOR M= 1 TO 6
160 K$="BM2,22;" 'LOCATES FIRST
NUMBER
```



```

170 L$="BM14,22;" 'LOCATES SECON
D NUMBER
180 M$="BM26,22;" 'LOCATES THIRD
NUMBER
190 N$(1)="BU8BR3R1D8BL2R4"
'1
200 N$(2)="BU7E1R6F1D2G1L6G1D3R8
U1" '2
210 N$(3)="BU6U2R8G3L1BR1F2D2G1L
6H1U1" '3
220 N$(4)="BR6U8G6R8"
'4
230 N$(5)="BU2F2R4E2U2H2L6U2R8"
'5
240 N$(6)="BU4R6F1D2G1L4H2U4E2R4
F1" '6
250 IF K=1 THEN DRAW K$+N$(1)
260 IF K=2 THEN DRAW K$+N$(2)
270 IF K=3 THEN DRAW K$+N$(3)
280 IF K=4 THEN DRAW K$+N$(4)
290 IF K=5 THEN DRAW K$+N$(5)
300 IF K=6 THEN DRAW K$+N$(6)
310 IF L=1 THEN DRAW L$+N$(1)
320 IF L=2 THEN DRAW L$+N$(2)
330 IF L=3 THEN DRAW L$+N$(3)

```

```

340 IF L=4 THEN DRAW L$+N$(4)
350 IF L=5 THEN DRAW L$+N$(5)
360 IF L=6 THEN DRAW L$+N$(6)
370 IF M=1 THEN DRAW M$+N$(1)
380 IF M=2 THEN DRAW M$+N$(2)
390 IF M=3 THEN DRAW M$+N$(3)
400 IF M=4 THEN DRAW M$+N$(4)
410 IF M=5 THEN DRAW M$+N$(5)
420 IF M=6 THEN DRAW M$+N$(6)
430 DRAW"BM2,10;U8BR8G4L4BR4F4BR
4U8BD8R8BR4U8F4E4D8" 'DRAWS K,L
AMD M
440 FOR Q= 0 TO 6.28318 STEP.05
'USE STEP .002 FOR CLOSE LINE
450 R=94*COS(K*Q)
460 X=1.35*R*SIN(L*Q)
470 Y=R*COS(M*Q)
480 IF X>126 OR X<-128 GOTO 500
490 PSET(128+X,96+Y)
500 NEXT Q
510 FOR T= 1 TO 2000:NEXT T
520 PCLS
530 NEXT M:NEXT L:NEXT K
540 GOTO 120
550 END

```

CoCo Concoctions

By David Allen

Type in and run *Apple Pie* while your printer is online, and you'll have a recipe printing out that will make your mouth water. This program is designed for an Epson compatible printer. You will have to alter the control codes in lines 450 through 480 for your particular printer.

The listing: APPLEPIE

```

10 ' APPLEPIE 04/02/85
20 REM: ONE-CRUST APPLE PIE
30 L1$ = "DOROTHY ALLEN"
40 L2$ = "P.O. BOX 531"
50 L3$ = "BREWSTER, WA. 98812"
60 L4$ = "PHONE: 689-2831"
70 GOSUB 440
80 PRINT #-2,TAB(16);"APPLE PIE
"
90 PRINT#-2:PRINT#-2
100 PRINT#-2,TAB(14);"ONE CRUST
PIE"
110 PRINT#-2:PRINT#-2
120 PRINT#-2," PASTRY FI
LLING TOPPING "
130 GOSUB 480
140 PRINT#-2:PRINT#-2
150 PRINT#-2,TAB(9);"MIX AND ADD
";TAB(32);"MIX TOGETHER";
160 PRINT#-2,TAB(55);"BAKE AT 37
5"

```

4K

```

170 PRINT#-2,TAB(9);"TOGETHER ";
TAB(32);"AND TOSS WITH";
180 PRINT#-2,TAB(55);"1 HOUR"
190 PRINT#-2,TAB(36);"APPLES"
200 PRINT#-2:PRINT#-2
210 PRINT#-2,TAB(9);"1 CUP FLOUR
";TAB(32);"1/2 CUP SUGAR";
220 PRINT#-2,TAB(55);"1/2 CUP SU
GAR"
230 PRINT#-2,TAB(9);"1 CUBE MARG
ARINE";TAB(32);"2 TBSP FLOUR";
240 PRINT#-2,TAB(55);"1/2 CUP FL
OUR"
250 PRINT#-2,TAB(9);"1/4 CUP MIL
K";TAB(32);"1/2 TSP CINNAMON";
260 PRINT#-2,TAB(55);"1/3 CUP MA
RGARINE"
270 PRINT#-2,TAB(32);"1/8 TSP NU
TMEG"
280 PRINT#-2,TAB(32);" DASH O
F SALT"
290 PRINT#-2,TAB(32);"4 LARGE GO
LDEN APPLES"
300 PRINT#-2:PRINT#-2
310 PRINT#-2,TAB(17);"PREPARE PA
STRY AND TURN INTO 9 INCH PIE PL
ATE"
320 PRINT#-2,TAB(25);"POUR IN TH
E APPLE PIE FILLING"
330 PRINT#-2,TAB(27);"SPRINKLE W
ITH THE TOPPING"
340 PRINT#-2:PRINT#-2
350 PRINT#-2,TAB(30);"FROM THE K

```



```

ITCHEN OF"
360 GOSUB 440
370 PRINT#-2,TAB(13);L1$
380 PRINT#-2,TAB(13);L2$
390 PRINT#-2,TAB(13);L3$
400 PRINT#-2,TAB(13);L4$
410 GOSUB 480
420 END
430 REM: DEFINE MACRO FOR EMPHAS

```

```

IZED AND EXPANDED TEXT
440 PRINT#-2:ESC$=CHR$(27)
450 PRINT#-2,ESC$;CHR$(43);ESC$;
"E";ESC$;"W";CHR$(1);CHR$(30)
460 PRINT#-2,ESC$;CHR$(33):RETUR
N
470 REM: REINITIALIZES PRINTER T
O NORMAL PRINTING
480 PRINT#-2,CHR$(27);"@":RETURN

```

CoCo 3

16K
ECB

Who'll Win on the Gridiron?

By Jeff Remick

Football Winner helps you try to pick the winning team in any football game. When you run the program, you will be asked for the names of the two teams playing (remember to put the home team first). The computer then asks you questions about the teams — you may need to refer to the sports page of your newspaper for help. When all the questions have been answered, the computer will predict a winner.

The listing: FOOTBALL

```

1 ' *****
2 ' **
3 ' ** FOOTBALL WINNERS **
4 ' ** BY **
5 ' ** JEFF REMICK **
6 ' **
7 ' *****
10 POKE65495,0:CLS:PRINT@104,"Fo
otball Winners"
20 PRINT@175,"by":PRINT@234,"Jef
f Remick":PRINT@355,"press any k
ey to continue":POKE65314,80:EXE
C 44539
30 CLS
40 PRINT"TEAM NAMES.HOME TEAM FI
RST":INPUT A$,B$
50 CLS:W=0:L=0:T=0:WH=0:LH=0:PA=
0:PF=0:WA=0:LA=0
60 PRINT@10,A$
70 PRINT:INPUT "WINS";W
80 INPUT "LOSSES";L
90 INPUT "TIES";T
100 INPUT "WINS AT HOME";WH
110 INPUT "LOSSES AT HOME";LH
120 INPUT "POINTS FOR";PF
130 INPUT"POINTS AGAINST";PA
140 GOSUB360 :GOSUB400

```

```

150 A=A+W*2-L-(T/2)+(WH/2)-(LH/2
)+FP-AP+.5
160 CLS:W=0:L=0:T=0:WH=0:LH=0:PF
=0:PA=0
170 PRINT@10,B$
180 PRINT:INPUT"WINS";W
190 INPUT"LOSSES";L
200 INPUT "TIES";T
210 INPUT "WINS AWAY";WA
220 INPUT "LOSSES AWAY";LA
230 INPUT "POINTS FOR";PF
240 INPUT "POINTS AGAINST";PA
250 GOSUB360:GOSUB400
260 B=B+W*2-L-(T/2)+(WA/2)-(LA/2
)+FP-AP
270 CLS
280 PRINT@8,"FOOTBALL WINNERS"
290 PRINT STRING$(32,"-")
300 PRINT:PRINT@72,"MOST POINTS
WINS":PRINT:PRINT
310 PRINT"HOME-----";A$"-";A
320 PRINT"VISITORS-";B$;"-";B
330 PRINT:PRINT:PRINT
340 POKE65494,0:PRINT@330,"AGAIN
(Y/N)";:INPUT A$
350 IF A$="Y" THEN 30 ELSE END
360 FOR Q=0 TO 3000 STEP 100
370 IF PF>Q THEN NEXT Q
380 FP=Q/100/2-.5
390 RETURN
400 FOR Q=0 TO 3000 STEP 100
410 IF PA>Q THEN NEXT Q
420 AP=Q/100/2-.5
430 RETURN

```

Contributions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

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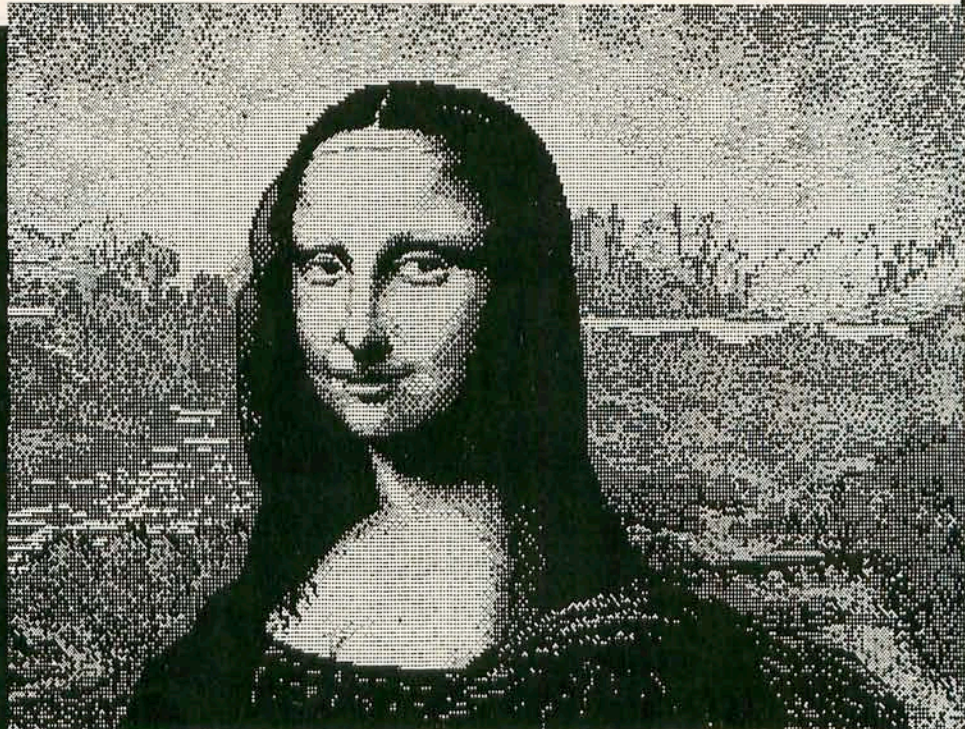
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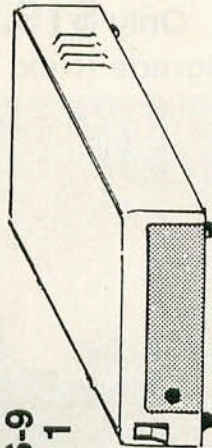
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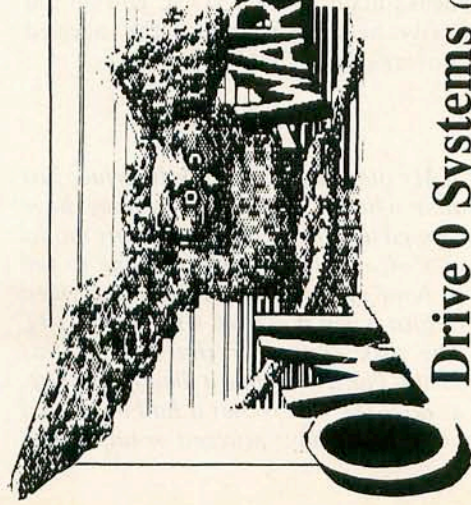
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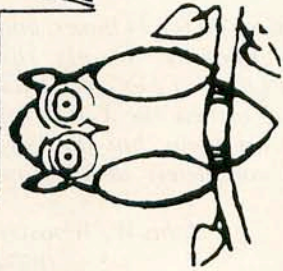
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The Death of a Keyboard

By Marty Goodman
Rainbow Contributing Editor

I left my CoCo 1 on for 24 hours, and when I came back to it only the CONTROL-C (CLEAR-C) key sequence was working. I turned the CoCo off then turned it on again, but the keyboard seemed completely dead. How can I fix it?

John W. Wooster
(JW47)
Jackson, MI

The most common cause of a suddenly, completely *dead* keyboard is a joystick button being somehow depressed. So, first unplug your joysticks and see if the problem goes away. Then make sure that the contacts for the joystick buttons on the joystick connector are not somehow shorted to ground.

If this is not the case, then you must determine whether the CoCo motherboard is at fault, or whether the fault lies in the keyboard. This can be done by swapping a keyboard with another CoCo 1 and trying out *your* keyboard in the other CoCo 1. If you don't have access to another CoCo 1, you can accomplish the same thing (albeit a bit more tediously) by using a VOM as a continuity checker along with the schematic diagram of the keyboard matrix to make sure that all the keys cause the appropriate shorts between row and

column contacts on the keyboard cable (this tests the keyboard), and then by shorting with a jumper wire appropriate pins on the CoCo motherboard connector (referring to the keyboard matrix schematic again) and seeing if the right characters are generated on the screen.

In your case, if the problem is not a joystick problem, and if you confirm the keyboard is still visibly plugged into the CoCo motherboard, it sounds like you may have a dead keyboard PIA chip inside the CoCo. On the older CoCo 1s, this is a 6821 chip, and on the late model (F or NC board CoCo 1s) this would be a 6822 chip. Either chip is readily and inexpensively available from Tandy National Parts. You may be able to check this first by swapping the 6821 or 6822 chip with another CoCo 1. Be sure you get the *right* chip by referring to the schematic diagram of your particular model CoCo or merely by tracing the connections from the CoCo motherboard keyboard connector to the PIA chip they go to.

CoCo-IBM Joystick Swap

Can a CoCo 3 two-button joystick be used on the IBM PC XT or clones? How about using an IBM PC XT type joystick on a CoCo 3?

John Bennett
(JOHNGB)
Shelby Township, MI

The joysticks used by the CoCo 3 and by the IBM PC XT are pretty much electrically identical. The difference between them is merely in the connector used. So, yes, both conversions are possible, provided you are dealing with a two-button joystick. The CoCo 3 manual gives you the pinout of the

joystick port. All you need to know is the pinout of the IBM PC's joystick port, and then you (or any competent hacker) can make the needed conversion given the proper connectors, which are available at Radio Shack stores.

The pinout of the IBM PC type joystick is as follows:

PIN	Function
1	+5 VDC
2	button 4
3	position 0 (wiper of the potentiometer)
4	ground
5	NC
6	position 1
7	button 3
8	+5 VDC
9	+5 VDC
10	button 6
11	position 2
12	ground
13	position 3
14	button 7
15	ground

Using this information, and some checks made using a VOM, you should easily be able to make the needed conversions.

Zapped Multi-Pak

My old gray Multi-Pak Interface just ain't what it used to be. I may have zapped it. When I plug it into any model of CoCo, it causes the machine to fail to boot up (although I get some video output when it is used with a CoCo 1). The disk controller that was in this Multi-Pak at the time it died works fine, as does the CoCo that it had been used with. I may have plugged or unplugged

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

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the pack into or out of the CoCo with the power on. Can you tell me how to fix it?

Mike Andrews
(MANDREWS)
Gary, IN

It sure sounds like your Multi-Pak Interface has gotten "zapped." One of the common causes of this is a blown 74LS367 chip. The MPI uses several of these to buffer the CoCo's address and other lines. Try checking continuity between every input on all the LS367 chips and ground using a VOM. If you find any that are nearly zero ohms from ground, then you have located a blown chip, and must remove and replace it. A better approach might be to hook up an oscilloscope to all of the address lines, one at a time, while the MPI is in use. You may be able to identify one that is tied low or high. If so, this is connected to a bad LS367 chip. I have fixed two blown MPIs in this fashion. The 74LS245 that buffers the data lines could also be the culprit. Note that all models of MPI use these chips, so this advice is good for *any* blown MPI. Check also for shorts between the NMI or the HALT line and ground inside the MPI. It is rare (though always possible) for the PAL chip in the MPI to be the cause of the problem here.

Why You Avoid Y

I find I am unable to boot OS-9 using a Korean CoCo and a Y cable between the CoCo and the disk controller. Yet I can boot using the same setup and an older model CoCo. Why is this?

Mark E. Schweder
(MSCHWEDER)
Gainesville, FL

You should not use a Y cable at all. Period. Instead, it is essential, if you want to use more than one card in the CoCo system bus, that you buy a Multi-Pak Interface. The reason is that the Y cable causes the very fragile, unbuffered CoCo system bus to be stressed to the limit by its added capacitance and other properties. In some cases this causes a marginal system that works *most* of the time, and in others it causes a system that is unable to do Disk I/O. How bad an effect the Y cable has is probably determined by what batch of chips was used in the CoCo, and other very minor details of differences in design between various models of the CoCo. Note, also, that OS-9 puts a particular strain on the disk I/O hardware, and if a problem is to occur, it is most likely to show up under OS-9.

For those who insist on ignoring the advice, your system may *appear* to work correctly, but you have removed all margin of safety from the disk I/O hardware, and risk a massive crash at any moment. The longer the Y cable, the more likely it is to cause trouble. I must confess that in some experiments I have found that Y cables that have no more than a total of an inch of ribbon cable seem to be the most reliable. But I do not recommend even these.

Lowercase on CoCo 2

How can I take advantage of the lowercase display capability built into the late-model Korean CoCo 2s? Can I replace the character set in the CoCo 32-column display with characters of my own design?

Alexander L. Schultz
(EXLAX)
Marysville, KS

I've consulted with my friend Art Flexser of SpectroSystems, for he is the master of CoCo 2 lowercase in these parts. The easiest way to make use of the 32-column lowercase capabilities present in the 'B' model Korean CoCos would be to buy ADOS Version 1.02. (If you own a previous version of ADOS, you can upgrade to Version 1.02 for \$10.) Look for the SpectroSystems ad in this issue of RAINBOW.

If you can put your CoCo into 64K mode, the following pokes will make the needed lowercase mods under BASIC:

POKE &H95C9, &H57: POKE &HFF22, &H50 will produce a green border; POKE &H95C9, &H17: POKE &HFF22, &H10 will produce a black border; POKE &H95C9, &H37: POKE &HFF22, &H30 will give you an inverse screen. All will give you true lowercase.

Note that you'll have to re-poke &HFF22 whenever you use PMODE 3 or 1. If you get ADOS 1.02, you will *not* need to re-poke &HFF22 in such cases.

Some folks have published the suggestion that one try POKE 359, 57: POKE &HFF22, &H50, which can be done without using the 64K mode. That approach is to be *avoided*! It disables the return to the text screen upon breaking out of a program that was in graphics mode. Much worse, the POKE 359, 57 disables ASCII saves to tape or to disk, with *no* indication that any failure ever occurred until you try to read your saved file, which will be totally blank.

Note that a 'B' model Korean CoCo 2 is required for all this. These are the CoCo 2s that have a 'B' suffix after their catalog number on the machine (e.g., 26-2027B, 26-3134B and 26-3136B).

As for modifying the character set used by the CoCo 2, it is possible but cannot be done without significant hardware hacking. In the early days of the CoCo, several manufacturers produced "lowerkits" that would do exactly what you wanted, provided you could burn your own 2716 EPROM. You see, the VDG chip does have provisions for getting its character set from an external character generator ROM. But the CoCo did not implement this option, and a special board with extra circuitry had to be added. With the advent of the CoCo 2B with built-in lowercase and later the CoCo 3 with full 80-column lowercase, the market for lowerkits ended, and none have been offered for sale for quite a while.

Booting Micro Illustrator

My copy of Micro Illustrator will not boot properly on my CoCo 3. How can this be fixed?

Greg Kazian
Greer, SC

The problem is caused by the fact that *Micro Illustrator* contains its own mini OS-9 Level 1 Version 1.0 or 1.01. Neither of these early versions of OS-9 can boot properly on the CoCo 3 because they overwrite the interrupt vectors of the CoCo 3 that live at \$FEE0 through \$FEFF. You can get around this problem by first booting up OS-9 Level 1 Version 2.00, then putting the *Micro Illustrator* disk in Drive 0 and pressing reset. This will cause a reboot under OS-9 Level I Version 2.0, and *Micro Illustrator* will start working. This same trick will fix the same problem that you will encounter on the CoCo 3 with *DL LOGO*, *Trivia Fever*, and one or two other older CoCo OS-9 products.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

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ACCOUNTS RECEIVABLE

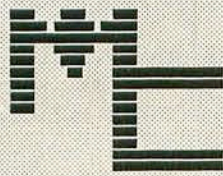
Includes detailed audit trails and history reports for each customer, prepares invoices and monthly statements, mailing labels, aging lists, and an alphabetized customer listing. The user can define net terms for commercial accounts or finance charges for revolving accounts. This package functions as a standalone A/R system or integrates with the Small Business Accounting package.

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Do You Hear What I Hear?



By John Mosley



*Your ears do
not deceive —
it's CoCo
singing in four
voices*

The holiday season is a time for singing, so let your CoCo join the chorus of carolers with *Do You Hear What I Hear*, a four-voice music and graphics program.

Do You Hear What I Hear is actually two programs — a BASIC driver (to create graphics, play and load music) and a machine language editor.

Each memory location in the CoCo from 0 to 65,535 holds one value between 0 and 255 or between &H00 and &HFF. The values in ML SONG, Listing 3, are in hexadecimal. I chose this format because it involves less typing.

Start off by typing in Listing 1; save it on the cassette you are using. Then type in Listing 2 and save it on another tape, or on the reverse side of your tape, leaving about a 30 second gap between listings 1 and 2. Run Listing 2. You will not load an old file if you are just starting to enter Listing 3. When prompted for the start address, enter a value of 16128.

Enter Listing 3 one hexadecimal value at a time. All of the hexadecimal values are separated by two spaces. When you are through entering Listing 3, or when you have to stop entering, type S and press ENTER. If you are just stopping temporarily and plan to resume entering later, write down the number to the left of the 'S' you typed *before* you press ENTER. The number should be five digits long.

When you are ready to resume entering, use that number as your start address. You will have to load the old file you saved before you can resume entering Listing 3.

When you have finished and everything is saved properly, all you have to do is load and run XMASSONG, leave the play button down, and follow the prompts.

As listed, XMASSONG will work with a disk drive. MLEDITOR, however, is set up for tape users. To use MLEDITOR on a disk system, change CLOADM to LOADM in Line 4. Also, change CSAVEM to SAVEM

John Mosley is a freshman at Portland High School, in Portland, Conn. He enjoys working with the Color Computer, and especially likes sound and graphics.

in Line 10 and change "cassette" to "disk" in Line 11. Now, when you enter Listing 3 into the editor, the resulting machine language file will be saved to disk instead of tape.

For those who get RAINBOW ON TAPE and want to transfer ML SONG to disk, the start, end and transfer addresses are \$3F00, \$4F24 and \$3F00, respectively. Simply CLOAD the file

from tape and type SAVEM"ML SONG",&H3F00,&H4F24,&H3F00 followed by ENTER.

(Questions about this program may be directed to the author at 420 Main Street, Portland, CT 06480. Please enclose an SASE when writing for a reply.) □

Editor's Note: The song file, ML SONG, will replace Listing 3 on this month's RAINBOW ON TAPE and RAINBOW ON DISK.

✓	130	.....3	300	.....224
	180	.....164	END	.....67
	240	.....222		

Listing 1: XMASSONG

```

10 DIMC$(80):CLEAR120,&H3EFF:CLE
AR1000
20 PMODE4,1:PCLS0:SCREEN1,1:FORT
=0TO60STEP2:LINE(T,0)-(T,60),PSE
T:NEXTT
30 FORT=1TO1000:NEXTT:CLS:PRINT"
IF BOX IS BLUE THEN PRESS <C>
TO CONTINUE, ELSE RESET AND RUN"
:GOSUB 370:PCLS0
40 CLS 4:PRINT@131,"DO YOU HEAR
WHAT I HEAR";:PRINT@330,"BY: JOH
N H. MOSLEY";:FORT=1TO2000:NEXTT
50 '***DO YOU HEAR WHAT I HEAR**
*
60 PRINT@449,"PREPARE (C)ASSETTE
OR (D)ISK:";
70 A$=INKEY$:IFA$=""THEN70
80 IF A$="C"THEN100 ELSE IF A$="
D"THEN90
90 LOADM"ML SONG":GOTO110
100 CLOADM"ML SONG"
110 LINE(5,4)-(251,187),PSET,B:P
OKE178,2:PAINT(0,0),,1
120 CLEAR1000:C$="C1URUE2RERER5F
RF3DFD36L4U38D3HU2L5GLG3LH2F2U3F
R2EU4ERD4R2U4R2FRD2R2D2GE2DFD2G4
E2D5GE3D5G3ED5GE2RD4G3ED5GE3D5G3
R"
130 FORD=1TO68:READA,B:PSET(A,B,
1):NEXTD
140 DATA 88,8,88,14,94,8,94,14,1
61,10,162,11,166,11,167,10,161,1
6,162,15,166,15,167,16,163,41,16
3,47,169,41,169,47,18,83,18,87,2
2,83,22,87,89,77,94,74
150 DATA 215,12,215,14,213,15,21
7,15,215,16,213,17,217,17,211,18
,215,18,219,18,213,19,217,19,211
,20,215,20,219,20,209,21,213,21,
217,21,221,21,211,22,215,22,219,
22

```

```

160 DATA 209,23,213,23,217,23,22
1,23,211,24,215,24,219,24,209,25
,213,25,217,25,221,25,211,26,215
,26,219,26,209,27,213,27,217,27,
221,27,211,28,215,28,219,28,213,
29,217,29,215,30

```

```

170 FOR A=19 TO 219 STEP 40:DRAW
"BM=A;,130;"+C$:PAINT(A+4,129),1
,1:PAINT(A+12,126),1,1:PAINT(A+1
6,132),1,1:PAINT(A+16,142),1,1:P
AINT(A+16,152),1,1:PAINT(A+16,16
2),1,1:NEXT A

```

```

180 DRAW"C1BM42,18;NU3NR3ND3NL3N
E2NF2NG2NH2":DRAW"BM91,11;NU3NR3
ND3NL3":DRAW"BM164,13;NU4NR4NL4N
D4":DRAW"BM166,44;NU4NR4ND4NL4NE
NFNGNH":DRAW"BM194,95;NU4ND4NR3N
L3NENFNGNH":DRAW"BM89,74;F2D2BR3
BU1H2U2BU2RFRF2D3G2LGL3HLH2U3E2R
ER3"

```

```

185 DRAW"BM20,85NU3NR3ND3L3"
190 DRAW"C1BM6,49;ERE5UEUEUEU3EU
8EU2D2FD3FD2FD2FD2FD2FEUEUEU2EUE
U2EU4RU2D2RD8FD4FDFDFDFDF4RDRL5H
3UHUHUHUHUHU3D3LDG2DGDGL2HUHUH2U
LU3D3GDGDGDGDGDG2LGL4":PAINT(18,
30),1,1

```

```

200 DRAW"C1BM233,44;DG2LH2U2E3R2
F2D4G3L30H2F2R9U17FRD16U16R2D16U
16R2D16U16E2D18U4REU2H":DRAW"BM2
10,35;GD2R"

```

```

210 C$="C1R3FR2FR7FR2F3D6GDG2D3F
D3FD2F3RL5H2U2HU3HU2H2L5DGD4GD4G
DL4EUEU4EU4EU5HU4HU3H2F2BR3BD2FR
6FR3FD5GL9U5HU2":DRAW"BM77,21;"+
C$:DRAW"BM105,21;"+C$:PAINT(90,2
5),1,1:PAINT(120,25),1,1

```

```

220 DRAW"C1BM49,49EUEU3EU4EU4HU3
HUHUHERE2R2ER3FR2FRFRER3FRLGL2GL3
HL2HL3GLGFD2FER2FR2FR2L2G2LHL2
GD3GD4GDR2FR3FR2FRFRER3FRLGL2GL3H
L3HL3HL3GLG":PAINT(53,24),1,1:PS
ET(51,47,1)

```

```

230 DRAW"C1BM130,21;R4F6DFDFDFD2
RU2EUEUEUE6R4G3LG3DGDGDGDGD2GD10
F2RL9RE2U9HU2HUHUHUHUH3LH3":PAIN
T(140,30),1,1

```

```

240 C$="C1FD2L2U2D2GLG3DGD2FDF3R
FR2ERE3UEU2HUH3LHL2D13U13GLD11U1
1G2D7U7E2RER2D13U13FRD11U11F2D7U
2LU3L2U2D2RD3LD2":FORA=33TO233ST
EP40:DRAW"BM=A;,168;"+C$:NEXTA
250 DRAW"C1BM31,76;U3H3LHL2HL10G

```



```

LG2DGDGD3ØFDF3R12ER2ERE3U3G4L3GL
11H2U29EU2E2R11FR2F4":PAINT(2Ø,7
Ø),1,1
26Ø DRAW"C1BM35,68;R4FD5FD3FD8FE
2R8FRF3DFD2FD1ØFDF3L3H3UHU1ØHU2H
2LHL5G3DGD7GD4GD2GL5RE2U3EU6EU8H
U9HU3HU4H2":PAINT(4Ø,8Ø),1,1
27Ø DRAW"BM64,86;R4F2ERE2R6FRF3G
2H2LHL4G3DGD5FD7GD3L4EU4EU4HU6HU
3H3":PAINT(7Ø,9Ø),1,1
28Ø DRAW"BM88,85;R7G2D21F2L7E2U2
1H2":PAINT(91,91),1,1
29Ø C$="G2H3L8G2D3FRFR6FRFRF3DFD
4GDG3LGLGL5HLH3E2F3R5ERE3U3HUH2L
HL5HL2HLH2U4EUE2RER8FRF3":DRAW"B
M116,86;" +C$:DRAW"BM226,86;" +C$:
PAINT(11Ø,94),1,1:PAINT(22Ø,94),
1,1
3ØØ DRAW"BM125,68;R7G2D13R6E2D7H
2L6D21F2L7E2U21L6G2U7F2R6U13H2":
PAINT(128,8Ø),1,1
31Ø DRAW"C1BM141,84;R4FDFRE2RER3
FRF2D17FEU17E2RER3FRF4DFD11FD3F4

```

```

L3HLH2U4HU11H4L2GLGD16G3H3U16HLH
L2G4D5FD6GD2GDG2L3E3U4EU5HU7HUH3
":PAINT(145,85),1,1
32Ø DRAW"BM2Ø4,11Ø;L3U2GLGL8HLH2
UH2UHU12EUEUE3R12F3DFD22":DRAW"B
M189,86;R9F3D15GLG2L6H4UHU1ØEU2E
2":PAINT(19Ø,85),1,1
33Ø FORT=1TO29:READA,B:PRESET(A,
B):NEXTT:DATA13Ø,69,128,7Ø,129,7
2,128,74,129,76,128,78,129,8Ø,12
8,82,128,86,129,88,128,9Ø,129,92
,128,94,129,96,128,98,129,1ØØ,12
8,1Ø2,129,1Ø4,128,1Ø6,129,1Ø8,12
8,84,126,85,124,84,122,85,12Ø,84
,13Ø,85,132,84
335 DATA134,85,136,84
34Ø PMODE4,1:SCREEN1,1:GOSUB39Ø
35Ø EXEC&H3FØØ
36Ø FORT=1TO3ØØØ:NEXTT:GOTO35Ø
37Ø IFINKEY$=""THEN 37Ø
38Ø RETURN
39Ø FORT=1TO6ØØ:NEXTT
4ØØ RETURN

```

Listing 2: MLEDITOR

```

Ø CLS:CLER1ØØØ:CLER2ØØ, &H3EFF
1 PRINT" *** EDITOR ***"
2 FORT=1TO1ØØØ:NEXTT
3 INPUT"LOAD OLD FILE(Y/N):";C$
4 IFC$="Y" THEN GOSUB11:CLOADM"M
L SONG":GOSUB14:ELSE 5
5 CLS:INPUT"START ADDRESS:";A
6 FORX=A TO &H4F24:PRINTX;:INPUT
":&H";A$
7 IF A$="S" THEN 1Ø
8 POKEX,VAL(HEX$(A$))

```

```

9 NEXTX
1Ø GOSUB11:CSAVEM"ML SONG",&H3FØ
Ø,&H4F24,1:END
11 PRINT"READY CASSETTE(PRESS AN
Y KEY)"
12 IF INKEY$=""THEN12
13 RETURN
14 INPUT"MAKE PRINTOUT";C$:IFC$=
"Y" THEN 15 ELSE RETURN
15 FORT=&H3FØØ TO &H4F24 STEP12:
FOR TT=Ø TO 11:PRINT#-2,HEX$(PEE
K(T+TT));" ";:NEXTTT:PRINT#-2:N
EXTT

```

Listing 3: ML SONG

```

2Ø 2 2Ø E 8E 4Ø Ø EC 84 44 54 ED
81 8C 43 FE 2F F5 86 3F 1F 8B B6 FF
1 84 F7 B7 FF 1 B6 FF 3 84 F7 B7
FF 3 86 3C B7 FF 23 34 1 1A 5Ø 8E
44 Ø A6 8Ø B7 3F CD EC 81 97 CØ D7
C3 EC 81 97 C6 D7 C9 2Ø 16 81 FE 26
1Ø EC 84 97 CØ D7 C3 EC 2 97 C6 D7
C9 A6 4 97 CD 3Ø 8 A6 8Ø 2B E6 27
4C 97 CC D6 CD D7 CE A6 9F 3F CØ AB
9F 3F C3 A9 9F 3F C6 A9 9F 3F C9 B7
FF 2Ø CD C1 E3 84 DD C1 DC C4 E3 2
DD C4 DC C7 E3 4 DD C7 DC CA E3 6
DD CA A CE 26 A A CC 27 BF D6 CD
D7 CE 2Ø C7 3Ø 84 3Ø 84 B6 Ø Ø 8A
Ø 81 Ø 2Ø BA 4F 1F 8B 8E 4Ø Ø EC
84 48 58 ED 81 8C 43 FE 2F F5 35 81
43 9E FF 42 FB Ø 4Ø DF Ø 4Ø 47 FF
Ø 6Ø Ø FF Ø Ø FF FF Ø Ø FF FF
Ø Ø FF FF Ø Ø FF FF Ø Ø FF FF
Ø Ø FF FF Ø Ø FF FF Ø Ø FF FF
Ø Ø FF FF 42 48 4E 54 5A 5E 64 68

```

```

6C 7Ø 72 74 76 78 78 78 78 76 74 74
7Ø 6E 6C 6A 66 64 6Ø 5C 5A 58 54 52
5Ø 4C 4A 4A 48 46 44 44 42 4Ø 4Ø 3E
3E 3E 3C 3C 3C 3C 3C 3C 3C 3C 3E
3E 3E 3E 3E 4Ø 4Ø 4Ø 42 42 42 42 42
42 42 4Ø 4Ø 4Ø 4Ø 4Ø 3E 3E 3E 3C 3C
3A 3A 3A 3A 3A 3A 3A 3C 3C 3C 3E
3E 4Ø 42 42 44 46 48 48 4A 4A 4A
4A 4A 4A 4A 4A 4A 48 48 46 46 44 44
44 44 42 42 42 42 4Ø 4Ø 4Ø 4Ø 42 42
42 42 42 42 42 42 42 42 4Ø 4Ø 4Ø
4Ø 3E 3E 3C 3C 3A 3A 3A 3A 38 38 38
38 38 38 3A 3A 3C 3C 3E 3E 4Ø 42 42
44 46 46 48 48 4A 4A 4A 4A 48 4A
48 48 46 46 46 44 44 44 42 42 42 42
4Ø 4Ø 42 42 42 42 42 42 44 44 44 44
46 46 46 46 46 46 48 48 46 46 46 46
46 44 44 42 42 4Ø 3E 3C 3A 3A 38 36
34 3Ø 2E 2A 28 24 22 2Ø 1C 18 16 14
12 1Ø E C C C C C E 1Ø 12 14
18 1C 22 26 2A 32 38 3C 42 44 46 4A
4C 4E 52 54 58 5A 5C 5E 62 64 66 68
6A 6C 6E 7Ø 7Ø 72 72 74 76 76 78
78 78 78 78 78 78 78 76 76 74 74
72 72 7Ø 7Ø 7Ø 6E 6C 6C 6A 68 66 64

```


62	62	60	5E	5C	5C	5A	58	56	56	54	52
52	50	4E	4E	4C	4C	4A	4A	4A	4A	48	48
48	46	46	46	46	46	46	46	46	46	44	44
44	44	44	44	44	44	46	46	46	46	46	46
46	46	46	46	46	46	46	46	46	46	46	46
46	46	46	46	46	46	44	44	44	44	44	44
42	42	42	42	40	40	40	3E	3E	3E	3E	3E
3E	3C	3C	3C	3C	3C	3C	3A	3A	3A	3C	3A
3A	3C	3C	3A	3C	3A	3A	3C	3C	3C	3C	3C
3C	3C	3C	3C	3C	3C	3E	3E	3C	3E	3E	3C
3E	3C	3C	3C	3C	3C	3C	3A	3A	3A	3A	38
38	38	36	36	34	34	32	32	30	30	2E	2C
2A	28	28	26	24	24	22	20	1E	1E	1C	1A
18	18	16	14	14	12	12	10	10	E	C	C
C	C	C	A	A	A	A	C	C	C		
E	E	10	12	12	14	14	18	18	1A	1E	20
22	24	26	28	2C	2E	32	34	38	3A	3E	40
44	46	4A	50	56	5A	5E	60	64	66	68	6A
6A	6A	6A	68	66	64	62	60	5E	5C	5A	56
54	52	50	50	4E	4C	4E	4E	50	50	52	
54	58	5A	5C	5E	60	62	64	66	66	68	6A
6A	6C	6C	68	68	66	66	64	62	62	60	5E
5C	5A	5A	58	56	56	56	56	56	56	56	58
58	58	5A	5A	5A	5A	5C	5C	5C	5C	5C	5A
5A	5A	58	56	56	54	50	4E	4C	4A	48	44
42	42	40	3E	3E	3C	3C	3C	3A	3A	3E	3E
3E	40	40	42	44	44	46	46	48	4A	48	48
48	48	48	48	46	44	44	42	40	3E	3E	3C
3C	3A	3A	38	3A	38	38	3A	3A	3A	3C	3C
3E	3E	40	40	44	44	44	46	46	46	46	44
44	44	42	40	3E	3C	3A	38	36	32	30	2E
2C	2A	2A	26	26	24	24	24	24	24	26	26
26	28	28	28	2A	2A	2A	2C	2C	2C	2C	2C
2A	2A	28	26	26	24	22	20	1E	1C	1C	1A
1A	18	18	18	18	18	1A	1A	1C	1E	20	22
24	26	2A	2A	2C	30	30	32	34	34	36	36
34	32	30	30	2E	2A	2A	26	24	22	20	1E

1A	1A	1A	1A	1A	1A	1A	1C	20	24	24	2A
2E	32	36	3E	3C	40	48	4C	52	58	5C	60
64	66	68	6A	6C	6C	6A	68	66	64	60	5E
5A	56	54	50	4C	48	46	42	40	3C	3A	3A
3A	38	38	38	3A	3A	3A	3C	3E	40	42	44
44	46	48	48	4A	4A	4A	4A	4A	4A	48	48
46	46	44	44	42	40	40	3E	3E	3C	3C	3C
3C	3C	3C	3C	3E	3E	3E	40	40	40	42	42
42	44	44	44	44	42	42	40	40	40	3E	3C
3A	3A	38	38	36	36	36	34	34	34	34	34
34	34	34	36	36	38	38	3A	3A	3A	3C	3E
3E	40	40	40	40	40	40	40	3E	3E	3C	3C
3A	3A	3A	38	38	38	36	36	36	36	38	38
38	3A	3A	3A	3C	3E	3E	40	40	42	42	42
44	44	44	44	42	42	42	40	40	3E	3E	3C
3A	3A	38	38	36	36	34	34	34	34	34	34
34	34	36	36	36	38	38	38	3A	3A	3A	3A
3A	3A	3A	3A	38	38	36	36	36	34	32	30
30	30	2E	2E	2C	2C	2C	2E	2E	30	30	30
32	34	36	36	38	3A	3A	3C	3E	3E	3E	3E
3E	3C	3A	3A	36	34	30	2E	2A	26	24	20
1C	18	14	12	10	E	C	C	E	E	10	
14	16	1A	20	24	2A	2A	36	60	43	42	40
40	FE	43	42	40	40	60	0	0	10	A	
D9	7	3D	4	10	0	0	10	C	2D	9	1F
4	10	0	0	FF	0	0	0	0	0	0	
0	20	D	AB	5	6C	2	B6	0	0	20	D
AB	8	21	2	B6	0	0	10	D	AB	0	0
2	B6	0	0	10	D	AB	0	0	2	B6	0
0	10	C	2D	9	AB	4	10	0	0	10	C
2D	9	AB	4	10	0	FF	0	0	0	0	
0	0	0	0	20	D	AB	5	6C	2	B6	0
0	10	D	AB	8	21	2	B6	0	0	8	D
AB	0	0	2	B6	0	0	8	D	AB	9	1F
2	B6	0	0	10	D	AB	8	21	2	B6	0
0	10	D	AB	8	21	2	B6	0	0	10	D
AB	7	3D	4	10	0	0	10	D	AB	9	1F

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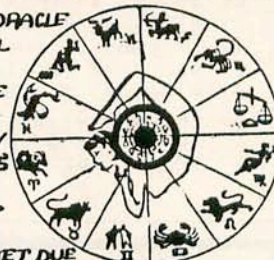
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4 10 0 0 FF 0 0 0 0 0 0 0
 0 FE 41 42 40 40 60 0 0 0 8 A
 D9 0 0 2 B6 0 0 8 0 0 0 0
 2 B6 0 0 8 A D9 0 0 2 B6 0
 0 8 0 0 0 0 2 B6 0 0 8 10
 42 9 AB 2 B6 0 0 8 0 0 9 AB
 2 B6 0 0 8 10 42 9 AB 2 B6 0
 0 8 0 0 9 AB 2 B6 0 0 20 15
 B3 A D9 2 B6 0 0 20 10 42 9 AB
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 FE 40 42 40 40 60 0 0 0 8 A
 D9 0 0 2 B6 0 0 8 0 0 0 0
 2 B6 0 0 8 A D9 0 0 2 B6 0
 0 8 0 0 0 0 2 B6 0 0 8 10
 42 9 AB 2 B6 0 0 8 0 0 9 AB
 2 B6 0 0 8 10 42 9 AB 2 B6 0
 0 8 0 0 9 AB 2 B6 0 0 20 15
 B3 A D9 2 B6 0 0 20 10 42 9 AB
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 FE 43 42 40 40 60 0 0 0 8 D
 AB 5 6C 2 B6 0 0 8 0 0 5 6C
 2 B6 0 0 8 D AB 5 6C 2 B6 0
 0 8 0 0 5 6C 2 B6 0 0 8 D
 AB 8 21 2 B6 0 0 8 0 0 8 21
 2 B6 0 0 8 D AB 8 21 2 B6 0
 0 8 0 0 8 21 2 B6 0 0 20 D
 AB 0 0 2 B6 0 0 8 C 2D 9 AB
 4 10 0 0 8 0 0 9 AB 4 10 0
 0 8 C 2D 9 AB 4 10 0 0 8 0
 0 9 AB 4 10 0 0 FF 0 0 0 0
 0 0 0 0 20 D AB 5 6C 2 B6 0
 0 10 D AB 8 21 2 B6 0 0 8 D
 AB 0 0 2 B6 0 0 8 D AB 9 1F
 2 B6 0 0 10 D AB 8 21 2 B6 0
 0 10 D AB 8 21 2 B6 0 0 10 D
 AB 7 3D 4 10 0 0 10 D AB 9 1F
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 FE 41 42 40 40 60 0 0 0 8 A
 D9 0 0 2 B6 0 0 8 0 0 0 0
 2 B6 0 0 8 A D9 0 0 2 B6 0
 0 8 0 0 0 0 2 B6 0 0 8 10
 42 9 AB 2 B6 0 0 8 0 0 9 AB
 2 B6 0 0 8 10 42 9 AB 2 B6 0
 0 8 0 0 9 AB 2 B6 0 0 20 15
 B3 A D9 2 B6 0 0 20 10 42 9 AB
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 FE 40 42 40 40 60 0 0 0 8 A
 D9 0 0 2 B6 0 0 8 0 0 0 0
 2 B6 0 0 8 A D9 0 0 2 B6 0
 0 8 0 0 0 0 2 B6 0 0 8 10
 42 9 AB 2 B6 0 0 8 0 0 9 AB
 2 B6 0 0 8 10 42 9 AB 2 B6 0
 0 8 0 0 9 AB 2 B6 0 0 20 15
 B3 A D9 2 B6 0 0 8 10 42 9 AB
 4 10 0 0 8 0 0 9 AB 4 10 0
 0 FE 43 42 40 40 60 0 0 0 8 10

42 9 AB 4 10 0 0 8 0 0 9 AB
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 20 12 3F A D9 4 8F 0 0 10 12
 3F A D9 0 0 0 0 8 D AB A D9
 0 0 0 0 8 0 0 A D9 0 0 0
 0 20 D AB A D9 4 8F 0 0 20 D
 AB A D9 0 0 0 0 FF 0 0 0 0
 0 0 0 0 10 10 42 C 2D 3 6A 0
 0 10 12 3F C 2D 3 6A 0 0 10 10
 42 C 2D 3 6A 0 0 10 E 7B C 2D
 3 6A 0 0 20 D AB A D9 2 B6 0
 0 10 D AB A D9 2 B6 0 0 10 C
 2D 9 AB 2 B6 0 0 FF 0 0 0 0
 0 0 0 0 10 A D9 9 1F 3 9E 0
 0 10 0 0 9 1F 3 9E 0 0 20 A
 D9 7 3D 3 9E 0 0 20 C 2D 7 3D
 4 10 0 0 10 A D9 7 3D 3 9E 0
 0 10 C 2D 7 3D 3 9E 0 0 FF 0
 0 0 0 0 0 0 20 D AB 8 9C 0
 3 6A 0 0 20 D AB 8 9C 3 6A 0
 0 10 D AB 8 9C 4 8F 0 0 10 0
 0 8 21 4 8F 0 0 10 D AB 8 21
 4 10 0 0 10 C 2D 8 21 4 10 0
 D9 7 3D 3 9E 0 0 10 0 7 3D
 3 9E 0 0 20 A D9 5 6C 3 6A 0
 0 20 E 7B 5 6C 3 B 0 0 10 D
 AB 7 3D 4 10 0 0 10 C 2D 7 3D
 4 10 0 0 FF 0 0 0 0 0 0 0
 0 20 A D9 5 6C 2 B6 0 0 20 15
 B3 8 21 2 B6 0 0 10 15 B3 0 0
 2 B6 0 0 10 15 B3 8 21 2 B6 0
 0 20 13 56 7 3D 4 10 0 0 FF 0
 0 0 0 0 0 0 20 15 B3 5 6C 0
 2 B6 0 0 10 15 B3 8 21 2 B6 0
 0 8 15 B3 0 0 2 B6 0 0 8 15
 B3 9 1F 2 B6 0 0 10 15 B3 8 21
 2 B6 0 0 10 15 B3 8 21 2 B6 0
 0 10 A D9 7 3D 4 10 0 0 10 C
 2D 9 1F 4 10 0 0 FF 0 0 0 0
 0 0 0 0 20 D AB 5 6C 2 B6 0
 0 20 D AB 8 21 2 B6 0 0 10 D
 AB 0 0 2 B6 0 0 10 D AB 0 0
 2 B6 0 0 10 C 2D 9 AB 4 10 0
 0 10 C 2D 0 0 4 10 0 0 FF 0
 0 0 0 0 0 0 20 D AB 5 6C 0
 2 B6 0 0 10 D AB 8 21 2 B6 0
 0 8 D AB 8 21 2 B6 0 0 8 D
 AB 9 1F 2 B6 0 0 10 D AB 8 21
 2 B6 0 0 10 D AB 8 21 2 B6 0
 0 10 D AB 7 3D 4 10 0 0 10 D
 AB 9 1F 4 10 0 0 FF 0 0 0 0
 0 0 0 0 FE 41 42 40 40 60 0 0
 0 8 A D9 0 0 2 B6 0 0 8 0
 0 0 2 B6 0 0 8 A D9 0 0
 2 B6 0 0 8 0 0 0 0 2 B6 0

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0 8 10 42 C 2D 2 B6 9 AB 8 0
0 C 2D 2 B6 9 AB 8 10 42 C 2D
2 B6 9 AB 8 0 0 C 2D 2 B6 9
AB 20 15 B3 D AB 2 B6 A D9 20 10
42 C 2D 4 10 9 AB FF 0 0 0
0 0 0 0 FE 40 42 40 40 60 0 0
0 8 A D9 0 0 2 B6 0 0 8 0
0 0 0 2 B6 0 0 8 A D9 0 0
2 B6 0 0 8 0 0 0 2 B6 0
0 8 10 42 C 2D 2 B6 9 AB 8 0
0 C 2D 2 B6 9 AB 8 10 42 C 2D
2 B6 9 AB 8 0 0 C 2D 2 B6 9
AB 20 15 B3 D AB 2 B6 A D9 20 10
42 C 2D 4 10 9 AB FF 0 0 0
0 0 0 0 FE 43 42 40 40 60 0 0
0 8 D AB A D9 2 B6 5 6C 8 0
0 0 0 2 B6 5 6C 8 D AB A D9
2 B6 5 6C 8 0 0 0 2 B6 5
6C 8 D AB A D9 2 B6 8 21 8 0
0 0 0 2 B6 8 21 8 D AB A D9
2 B6 8 21 8 0 0 0 2 B6 8
21 20 D AB A D9 2 B6 0 0 8 C
2D 9 AB 4 10 7 3D 8 0 0 0
4 10 7 3D 8 C 2D 9 AB 4 10 7
3D 8 0 0 0 4 10 7 3D FF 0
0 0 0 0 0 20 D AB A D9
2 B6 5 6C 10 D AB A D9 2 B6 8
21 8 D AB A D9 2 B6 8 21 8 D
AB A D9 2 B6 9 1F 10 D AB A D9
2 B6 8 21 10 D AB A D9 2 B6 8
21 10 D AB A D9 4 10 7 3D 10 D
AB A D9 4 10 9 1F FF 0 0 0
0 0 0 0 FE 41 42 40 40 60 0 0
0 8 A D9 0 0 2 B6 0 0 8 0
0 0 0 2 B6 0 0 8 A D9 0 0
2 B6 0 0 8 0 0 0 2 B6 0
0 8 10 42 C 2D 2 B6 9 AB 8 0
0 C 2D 2 B6 9 AB 8 10 42 C 2D
2 B6 9 AB 8 0 0 C 2D 2 B6 9
AB 20 15 B3 D AB 2 B6 A D9 20 10
42 C 2D 4 10 9 AB FF 0 0 0
0 0 0 0 FE 40 42 40 40 60 0 0
0 8 A D9 0 0 2 B6 0 0 8 0
0 0 0 2 B6 0 0 8 A D9 0 0
2 B6 0 0 8 0 0 0 2 B6 0
0 8 10 42 C 2D 2 B6 9 AB 8 0
0 C 2D 2 B6 9 AB 8 10 42 C 2D
2 B6 9 AB 8 0 0 C 2D 2 B6 9
AB 20 15 B3 D AB 2 B6 A D9 20 10
42 C 2D 4 10 9 AB 8 0 0 C 2D
4 10 9 AB FE 43 42 40 40 60 0 0
0 8 10 42 C 2D 4 10 A 3D 8 0
0 C 2D 4 10 9 AB FF 0 0 0
0 0 0 0 20 12 3F A D9 4 8F 0
0 10 12 3F A D9 0 0 0 8 D
AB A D9 0 0 0 0 8 0 0 A D9

0 0 0 0 20 D AB A D9 4 8F 0
0 20 D AB A D9 0 0 0 0 FF 0
0 0 0 0 0 0 10 10 42 C 2D
3 6A 0 0 10 12 3F C 2D 3 6A 0
0 10 10 42 C 2D 3 6A 9 AB 10 E
7B C 2D 3 6A 9 AB 20 D AB A D9
2 B6 0 0 10 D AB A D9 2 B6 0
0 10 C 2D 9 AB 2 B6 0 0 FF 0
0 0 0 0 0 0 10 A D9 9 1F
3 9E 7 3D 10 0 0 9 1F 3 9E 7
3D 10 A D9 8 21 3 9E 7 3D 10 0
0 9 1F 3 9E 7 3D 20 C 2D 9 AB
4 10 7 3D 10 A D9 9 1F 3 9E 7
3D 10 C 2D 9 AB 3 9E 0 0 FF 0
0 0 0 0 0 0 20 D AB A 3D
3 6A 8 9C 20 D AB A 3D 3 6A 8
9C 20 D AB A D9 4 8F 9 1F 10 1B
57 A 3D 4 10 7 3D 10 18 5B A 3D
4 10 7 3D FF 0 0 0 0 0
0 20 15 B3 12 3F 3 6A A D9 20 15
B3 12 3F 3 6A A D9 20 15 B3 10 42
2 B6 A D9 20 15 B3 10 42 2 B6 A
D9 FF 1C F7 12 3F 3 B A 3D 20 1C
F7 12 3F 3 B A 3D 20 1B 57 10 42
4 10 A D9 20 0 0 0 3 B 0
0 20 18 5B E 7B 4 10 A 3D FF 0
0 0 0 0 0 20 15 B3 D AB
3 6A 5 6C 20 15 B3 D AB 3 6A 8
21 10 15 B3 D AB 3 6A 5 6C 10 15
B3 D AB 3 6A 8 21 10 13 56 C 2D
4 10 7 3D 10 13 56 C 2D 4 10 9
1F FF 0 0 0 0 0 0 20 15
B3 D AB 2 B6 5 6C 20 15 B3 D AB
2 B6 8 21 10 15 B3 D AB 2 B6 5
6C 10 15 B3 D AB 2 B6 8 21 10 13
56 C 2D 4 10 6 16 10 13 56 C 2D
4 10 6 16 FF 0 0 0 0 0
0 10 15 B3 0 0 2 B6 5 6C 10 15
B3 0 0 2 B6 8 21 10 15 B3 A D9
2 B6 5 6C 10 13 56 9 AB 4 10 6
16 FF 0 0 0 0 0 0 10 15
B3 A D9 2 B6 8 21 10 15 B3 A D9
2 B6 8 21 10 15 B3 A D9 2 B6 8
21 10 15 B3 A D9 2 B6 8 21 FF 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 39 83 31 20 39 3A 32
34 36 34 34 32 30 31 82 32 20 39 3A
37 36 33 30 30 30 30 86 33 20 38
3A 35 32 30 31 31 31 32 30 82 34 20
38 3A 37 38 35 38 38 37 38 30 0 20
20 20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20 20
20 20 20 0 0 FF 0 0 0 0 FF FF

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TAG.....0000

NO TIME FOR SERGEANTS.....0000
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RETURN TO MAYBERRY.....2079

BABY THE LOST LEGEND.....XXXX
MATTER OF LIFE & DEATH.....0000
VIEW TO A KILL.....XXXX

ELECTRIC DREAMS.....2144
ROMANCING THE STONE.....0000
TARZAN-GREYSTOKE.....1194

MY SCIENCE PROJECT.....0000
PROTOCOL.....1852
RAMBO.....1104

RETURN OF THE JEDI.....0000
STRIPES.....1415

JAWS.....1092
MAN WITH ONE RED SHOE.....0000
TEEN WOLF.....2072

COMMANDO.....1282
PALE RIDER.....0000
SILVERADO.....1925

INVASION OF BODY SNATCHERS.....1983
UNFAITHFULLY YOURS.....0000
YOU ONLY LIVE TWICE.....1114

ABSENT MINDED PROFESSOR.....XXXX
EVIL THAT MEN DO.....0000
ROBIN HOOD-DISNEY.....XXXX

DUMBO.....1089

That's Entertain

By Randy Mayfield

If you own a video cassette recorder and have ever experienced the frustration of searching through a shelf full of video cassettes for a particular recording, you need *VCR Tapes*. This program maintains (on disk or tape) a file of up to 500 movie titles detailing which video cassettes they are on and the starting VCR digital counter value of each title.

The first step in setting up your *VCR Tapes* system is numbering your video cassettes. I use the pre-printed stick-on numbers included with each new cassette. Then type in and save VCR TAPES and run it. The program is menu-driven, with the main menu offering seven options:

Create new file — allows you to enter a title, tape number (###) and VCR digital counter reading (####) for each

Randy Mayfield is a radar electronics technician living in Melbourne, Florida, with his wife and two children. His hobbies include target shooting, woodworking and programming for the CoCo.



VCR TAPE CATALOG
FILE NAME: MOVIES

ABSENT MINDED PROFESSOR
TAPE#: 016 COUNTER#: XXXX

AIRPLANE
TAPE#: 039 COUNTER#: 1159

ALIEN
TAPE#: 046 COUNTER#: 1295

BABY THE LOST LEGEND
TAPE#: 009 COUNTER#: XXXX

BACHELOR PARTY
TAPE#: 005 COUNTER#: 2213

BACK TO THE FUTURE
TAPE#: 053 COUNTER#: 1658

BEASTMASTER
TAPE#: 034 COUNTER#: 0000

BILL COSBY HIMSELF
TAPE#: 031 COUNTER#: 1699

ment

recording. You must enter the tape numbers and counter numbers in the formats shown in parentheses, as all the information is compressed into a single string for conserving string space and for ease of storage.

Work in a file — use to update the file as your video cassette library grows and changes. The 'add' option has the same format as the Create function. The 'delete' option has the same format as the Scroll function, allowing you to scroll through the file and find the title to be deleted.

Printout file — the 'paper' option prints a hard copy listing of all recorded titles with tape numbers and counter numbers. The routine uses fanfold printer paper, skips perforations and prints 18 titles per page. The 'labels' option will print titles and their corresponding counter numbers for any video cassette you choose. The routine is for standard 3½-by-15/16 inch fanfold labels, using a condensed printer character set (16.7 cpi) to allow lengthy titles to fit on the labels, and prints up to four titles per label. If a tape contains more than four

titles, the printer will skip to the next label and continue printing. DMP-105 printer control codes for baud rate, condensed characters enable and condensed characters disable are located within lines 490, 610 and 690, respectively. Change these codes as required for other printers.

Save file — use to save your file to disk or tape. When a file is saved, you then have an option of keeping that file in RAM or erasing it. This allows the flexibility of creating a file or working on another one without having to restart the program (after 'erase') or to return to work on the file just saved (after 'retain').

Scroll file — allows scrolling forward and backward through a file on the CoCo video screen to find a title and its corresponding tape and counter numbers. This function is especially useful to those who do not have a printer to produce hard copy.

Sort file — uses a Shell-Metzner sorting algorithm to sort titles in alphabetical order. This is included as a menu selection, because you may not always

want to sort after an 'add' or 'delete' operation if only a few titles are involved.

Quit — use to exit the program. If a file is in RAM, you will be given the opportunity to return to the Save function, just in case you forgot to save the file.

If any of the Work, Printout, Scroll or Sort functions are chosen when no file is in RAM, program execution takes you to the 'load file' subroutine and you will be prompted to load an existing file from disk or tape. The program uses high-pitched beeps to prompt for keyboard response and a low-pitched tone to indicate erroneous entries.

VCR Tapes could also be used to catalog your computer cassettes or disks, although the printer labels option would require adjustments if different size labels are used.

(Questions or comments may be directed to the author at 1881 Player Circle North, Melbourne, FL 32935. Please enclose an SASE when requesting a reply.) □

✓	170	.....95	770	.....203
	270	.....247	930	.....203
	400	.....95	1050	.....217
	520	.....72	1220	.....224
	630	.....175	END	.....162

The listing: VCRTAPES

```

10 *****
20 '      VCR TAPE CATALOG
30 '      BY RANDY MAYFIELD
40 '      COPYRIGHT 1987
50 *****
60 '
70 CLEAR10000:PCLEAR1:Z=500:B=0:
W=0:P$="":DIMT$(Z)
80 '
90 '   MAIN MENU
100 '
110 CLS:PRINTSTRING$(32,128);:PR
INT@5,"vcr";:PRINT@9,"tape";:PRI
NT@14,"catalog";:PRINT@22,"menu"
;:PRINT@26,STRING$(6,128);:PRINT
:PRINT"1. CREATE NEW FILE":PRINT
"2. WORK IN A FILE":PRINT"      (A
DD, DELETE)"
120 PRINT"3. PRINTOUT A FILE":PR
INT"      (PAPER, LABELS)":PRINT"4
. SAVE FILE":PRINT"5. SCROLL FIL
E":PRINT"6. SORT FILE":PRINT"7.
QUIT":SOUND200,1:PRINT:PRINT"SEL
ECT ONE "
130 R$=INKEY$:IFR$=""THEN130
140 X=VAL(R$):IFX<1ORX>7THENGOSU
B1360:GOTO110
150 ON X GOTO190,330,490,740,890
,1070,1000
160 '
170 '   CREATE NEW FILE
180 '
190 IFB=0THEN 210 ELSECLS:SOUND1
,3:PRINT"A FILE ALREADY EXISTS I
N RAM!! YOU MUST 'SAVE' IT OR A
BANDON IT('QUIT') TO ENABLE CREA
TION OF ANEW FILE!":PRINT:PRINT
"PRESS ANY KEY FOR MAIN MENU."
200 IF INKEY$=""THEN200ELSE110
210 B=1:CLS:SOUND200,1:INPUT"NAM
E NEW FILE: ";F$:IFLEN(F$)>8THEN
GOSUB1360:GOTO210
220 CLS:PRINT"new FILE: ";F$:GOT
O240
230 CLS:PRINT"add TO FILE: "F$
240 PRINT@32,"ENTER TITLES (NO C
OMMAS),"":PRINT"      TAPE NUMBER
S,"":PRINT"      AND VCR COUNTER

```

```

NUMBERS."":PRINT"HIT <ENTER> WHEN
FINISHED."":PRINT"ENTRY#: ";B:SO
UND200,1:PRINT@192,"";:INPUT"Tit
LE: ";T$(B):IFT$(B)=""THEN B=B-1
:GOTO110
250 SOUND200,1:PRINT@256,"";:INP
UT"TAPE NUMBER (###): ";A$:IF LE
N(A$)<>3THENGOSUB1360:PRINT@256,
" ":GOTO250
260 T$(B)=T$(B)+A$
270 SOUND200,1:PRINT@320,"";:INP
UT"COUNTER NUMBER (###): ";A$:I
FLEN(A$)<>4THENGOSUB1360:PRINT@3
20," ":GOTO270
280 T$(B)=T$(B)+A$:B=B+1:IFB>Z T
HENSOUND1,3:PRINT:PRINT"YOU HAVE
MADE THE MAXIMUM NUMBEROF ENTRI
ES...":FORT=1TO2000:NEXTT:B=B-1:
GOTO110
290 IFW=1 THEN230ELSE220
300 '
310 '   WORK EXISTING FILE
320 '
330 IFB=Z THENSOUND150,1:GOTO110
ELSEIFB=0 THENGOSUB1280
340 CLS:PRINT"work EXISTING FILE
: ";F$:PRINT@32,"1. ADD":PRINT"2
. DELETE":PRINT"3. MAIN MENU":PR
INT:SOUND200,1:PRINT"SELECT ONE"
350 R$=INKEY$:IFR$=""THEN350
360 W=VAL(R$):IFW<1ORW>3THENGOSU
B1360:GOTO340
370 IFW=3 THEN110ELSEIFW=1 THENC
LS:B=B+1:GOTO230 ELSEX=0
380 CLS:X=X+1:PRINT"FIND TITLE T
O delete":PRINT:PRINT"      UP-AR
ROW = SCROLL FORWARD":PRINT"      D
OWN-ARROW = SCROLL BACK":PRINT"
      D = DELETE":PRINT"ANY
OTHER KEY = MAIN MENU":SOUND 20
0,1:GOTO940
390 CLS:PRINT"delete: ";MID$(T$(
X),1,L):PRINT"ARE YOU SURE (Y/N)
?":SOUND200,1
400 R$=INKEY$:IFR$=""THEN400
410 IFR$="N"THEN380ELSEIFR$="Y"TH
EN420ELSEGOSUB1360:GOTO390
420 A$=MID$(T$(X),L+1,3):D$=MID$(
T$(X),1,L):FOR Y=X TO B-1:T$(Y)
=T$(Y+1):NEXT Y:B=B-1
430 CLS:PRINT@32,D$:PRINT"HAS BE
EN DELETED":PRINT"FROM TAPE NUMB
ER ";A$:PRINT:PRINT:SOUND200,1:P
RINT"WANT TO DELETE ANOTHER (Y/N
)?"
440 R$=INKEY$:IFR$=""THEN440
450 IFR$="N"THEN340ELSEIFR$="Y"TH

```



```

HENX=X-1:GOTO38ELSEGOSUB136:GO
TO43
46 '
47 ' PRINT-OUT FILE
48 '
49 POKE15,18 ' THIS POKE FOR
DMP-105 PRINTER 2400 BAUD
50 IFB=0THENGOSUB128
51 CLS:PRINT"print FILE: ";F$:P
RINT"1. PRINT ON PAPER":PRINT"2.
PRINT ON LABELS":PRINT"3. MAIN
MENU":PRINT:SOUND200,1:PRINT"SEL
ECT ONE"
52 R$=INKEY$:IFR$=""THEN52
53 X=VAL(R$):IFX<1ORX>3THENGOSU
B136:GOTO51
54 IFX=3THEN11ELSEPRINT@192,"I
S PRINTER ON & READY?":SOUND200,
1:PRINT"HIT ANY KEY WHEN READY."
55 IF INKEY$=""THEN55
56 IFX=2THEN61
57 CLS:PRINT@260,"PRINTING: ";
F$:PRINT#-2,TAB(32)"VCR TAPE CAT
ALOG":PRINT#-2,TAB(32)"FILE NAME
: ";F$:PRINT#-2:Y=1
58 FORX=1TOB:L=LEN(T$(X))-7:PRI
NT#-2,TAB(15)MID$(T$(X),1,L):PRI
NT#-2,TAB(15)"TAPE#:";MID$(T$(X
),L+1,3);:PRINT#-2,"";:PRINT
#-2,"COUNTER#:";RIGHT$(T$(X),4)
:PRINT#-2:Y=Y+1:IFY=18THEN60
59 NEXTX:GOTO51
60 FORT=1TO16:PRINT#-2:NEXTT:Y=
1:GOTO59
61 PRINT#-2,CHR$(27)CHR$(20) '
CONTROL CODES FOR DMP-105 PRINT
ER CONDENSED CHAR. ENABLE
62 Y=1:CLS:PRINT"labels FOR: ";
F$:PRINT:PRINT"ENTER TAPE NUMBER
, AND THE LABEL(S) FOR THAT
TAPE WILL BE PRINTED.":PRINT"H
IT <ENTER> WHEN FINISHED.":PRINT
:PRINT:SOUND200,1:INPUT"TAPE NUM
BER (###): ";R$
63 IFR$=""THEN69ELSEIFLEN(R$)<
>3 THENGOSUB136:GOTO62
64 FORX=1TOB:L=LEN(T$(X))-6:IFM
ID$(T$(X),L,3)=R$THENA$=MID$(T$(
X),1,L-1):GOTO66
65 NEXTX:FORT=1TO7-Y:PRINT#-2:N
EXTT:GOTO62
66 A$=A$+P$:IFLEN(A$)>45THENA$=
LEFT$(A$,45):GOTO67ELSE66
67 IFY<5THENPRINT#-2,A$;:PRINT#
-2,RIGHT$(T$(X),4):Y=Y+1:GOTO65
68 PRINT#-2:PRINT#-2:Y=1:GOTO67

```

```

69 PRINT#-2,CHR$(27)CHR$(19) '
CONTROL CODES FOR DMP-105 PRINT
ER CONDENSED CHAR. DISABLE
70 GOTO51
71 '
72 ' SAVE FILE
73 '
74 IFB>0THEN76ELSECLS:SOUND1,3
:PRINT"NO FILE IN RAM TO SAVE!!"
:PRINT:PRINT"PRESS ANY KEY FOR M
AIN MENU":SOUND200,1
75 IF INKEY$=""THEN75 ELSE11
76 CLS:PRINT"save FILE: ";F$:PR
INT"WANT TO RENAME (Y/N)?:SOUND
200,1
77 R$=INKEY$:IFR$=""THEN77
78 IFR$="Y"THEN79ELSEIFR$="N"TH
EN81ELSEGOSUB136:GOTO76
79 PRINT:SOUND200,1:INPUT"ENTER
NEW NAME: ";M$:IFLEN(M$)>8THENG
OSUB136:GOTO76
80 F$=M$:CLS:PRINT"SAVE FILE: "
;F$
81 GOSUB117:OPEN"O",#D,F$
82 FORX=1TOB:PRINT#D,T$(X):NEXT
X:CLOSE#D:CLS:PRINTF$ " SAVED":PR

```

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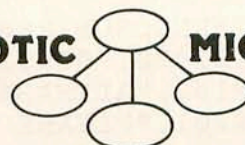
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```

INT:PRINT"1. RETAIN FILE IN RAM"
:PRINT"2. ERASE FILE IN RAM":PRI
NT:PRINT"SELECT ONE":SOUND200,1
830 R$=INKEY$:IFR$=""THEN830
840 X=VAL(R$):IFX<1 OR X>2 THENG
OSUB1360
850 IFX=1THEN110ELSE FOR T=1TOB:
T$(T)="" :NEXTT:B=0:W=0:GOTO110
860 '
870 '   SCROLL FILE
880 '
890 X=1:IFB=0THENGOSUB1280
900 CLS:PRINT"scroll FILE: ";F$:
PRINT:PRINT"      UP-ARROW = SCRO
LL FORWARD":PRINT"      DOWN-ARROW
= SCROLL BACK":PRINT"ANY OTHER K
EY = MAIN MENU":SOUND200,1:W=0:G
OTO940
910 R$=INKEY$:IFR$=""THEN910
920 IFR$=CHR$(94)THENX=X+1:GOTO9
30ELSEIFR$=CHR$(10)THENX=X-1:GOT
O930ELSEIFR$="D" AND W=2 THEN390
ELSE110
930 IF X>B THEN X=1 ELSE IF X<1
THEN X=B
940 IFT$(X)=""THEN950ELSEPRINT@2
56," ":L=LEN(T$(X))-7:PRINT@224,
"TITLE: ";MID$(T$(X),1,L):PRINT@
288,"TAPE#: ";MID$(T$(X),L+1,3):
PRINT@352,"CNTR#: ";RIGHT$(T$(X)
,4):GOTO910
950 CLS:SOUND1,3:PRINT"YOU HAVE
DELETED ALL TITLES IN":PRINTF$;"
!!":PRINT"IT HAS BEEN ABANDONED
IN RAM.":PRINT:PRINT"HIT ANY KE
Y FOR MAIN MENU.":B=0:W=0:F$=""
960 IF INKEY$=""THEN960ELSE110
970 '
980 '   QUIT
990 '
1000 CLS:PRINT"THANK YOU.":IFB>0
THENPRINT:PRINT"P.S. DID YOU SA
VE ";F$;" ?":PRINT"PRESS 'S' TO
RETURN AND SAVE IT,ANY OTHER KEY
TO QUIT.":SOUND200,1
1010 R$=INKEY$:IFR$=""THEN1010
1020 IFR$="S"THEN760ELSECLS:PRIN
T"THANK YOU":END
1030 '
1040 '   SHELL-METZNER SORT
1050 '
1060 IFB=0 THENGOSUB1280
1070 CLS:PRINT@70,"SORTING TITLE
S IN":PRINT@102,"ALPHABETICAL OR
DER.":PRINT@201,"PLEASE WAIT..."
:S1=B
1080 S1=INT(S1/2):IF S1=0THEN113

```

```

0 ELSE S4=1:S3=B-S1
1090 S5=S4
1100 S2=S5+S1:IF MID$(T$(S5),1)
< MID$(T$(S2),1) THEN1120ELSE111
0
1110 M$=T$(S5):T$(S5)=T$(S2):T$(
S2)=M$:S5=S5-S1:IF S5<1 THEN1120
ELSE1100
1120 S4=S4+1:IF S4>S3 THEN1080EL
SE1090
1130 CLS:PRINT@70,"SORT COMPLETE
D":SOUND150,1:FOR T=1TO2000:NEXT
T:GOTO110
1140 '
1150 'DISKTAPE SELECT SUBROUTINE
1160 '
1170 PRINT@32,"1. DISK":PRINT"2.
TAPE":PRINT:SOUND200,1:PRINT"SE
LECT ONE"
1180 R$=INKEY$:IFR$=""THEN1180
1190 D=VAL(R$):IFD<1ORD>2THENGOS
UB1360:GOTO1170
1200 PRINT:IFD=2THEN1220
1210 PRINT"DISKETTE LATCHED IN P
LACE?":GOTO1230
1220 D=-1:PRINT"POSITION TAPE":I
FB=0THENPRINT"PRESS PLAY BUTTON"
ELSEPRINT"PRESS RECORD & PLAY BU
TTONS"
1230 SOUND200,1:PRINT"HIT ANY KE
Y WHEN READY"
1240 IF INKEY$=""THEN1240ELSERET
URN
1250 '
1260 '   LOAD FILE SUBROUTINE
1270 '
1280 CLS:PRINT"load EXISTING FIL
E":SOUND200,1:INPUT"ENTER FILENA
ME: ";F$:IFLEN(F$)>8THENGOSUB136
0:GOTO1280
1290 CLS:PRINT"LOAD EXISTING FIL
E: ";F$:GOSUB1170:OPEN"I",#D,F$:
B=1
1300 IF EOF(D)=-1 THEN1320
1310 INPUT#D,T$(B):B=B+1:GOTO130
0
1320 CLOSE#D:B=B-1:RETURN
1330 '
1340 'INCORRECT ENTRY SUBROUTINE
1350 '
1360 SOUND1,3:PRINT@416,"INCORRE
CT ENTRY":PRINT@448,"PRESS ANY K
EY TO TRY AGAIN...":SOUND1,3
1370 IF INKEY$=""THEN1370
1380 PRINT@416," ":PRINT@448," "
:RETURN

```


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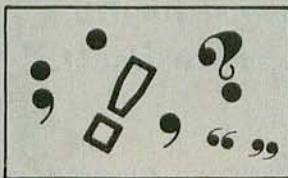


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Electricity and Circuit Experimentation

By Steve Blyn
Rainbow Contributing Editor

Computers are completely dependent on circuits. A circuit is a path or line of electric current. A complete or closed circuit is a path that makes an entire "circular" path returning back to its origin.

This month's program introduces youngsters to the world of electricity and circuits. Students are asked to draw a complete circuit using a dry cell and two light bulbs. When their circuit is complete, the bulbs light up.

A dry cell is illustrated in this program since it is the familiar source of electricity used in classrooms and by hobbyists. The first wire emanates from the negative pole of the dry cell, because electricity flows from negative to positive. Electricity may be thought of as the flow of negative ions.

The student uses the arrow keys to draw dotted lines, which represent real wires. Each time a wire is connected to a terminal, the computer beeps: The beeps act as clues that the student is on the right path.

Upon returning to the positive terminal of the dry cell, the student finds out whether he or she completed the circuit in an acceptable manner. If the circuit is complete, the light bulbs will light up. The student may then either press the 'E' key to end the program or the ENTER key to begin again.

Bear in mind that this program is

merely intended to act as an introduction. It is not an attempt to present an overview of the topic of electricity. The student may therefore connect the wires in any order as long as all of the terminal points are included. The shortest or easiest path to completing the circuit is left for you to discuss with the student.

"It often helps to involve the students in the programming to ensure their interest in the program itself."

Similarly, no attempt is made to distinguish between series and parallel circuits. Again, you may bring this topic up with the student at your own discretion. It is always interesting for the student to observe that there are several ways to successfully complete this circuit on the screen as well as in reality. Experimentation should always be encouraged. In short, you can use this program at any level of sophistication you feel is appropriate.

The program is quite straightforward and uncomplicated. Lines 40 through 210 draw the dry cell and the two light bulbs. Lines 30 and 220 set the initial wire at screen location 1,158. This is at the negative terminal. The dotted line I chose to represent the wiring is CHR\$(130). You may experiment with

other CHR\$s if you feel like being creative. It often helps to involve the students in the programming to ensure their interest in the program itself.

The wiring is moved by lines 230 to 270. The CHR\$s numbered 8, 9, 10 and 94 represent the four directional arrows. The computer checks at this point to see if any of the arrows are pressed and moves the wiring one space in that direction.

Lines 280 to 300 check to see if the student has left the boundaries of the screen. If so, his or her turn has ended (this was done to prevent aimless pressing of the arrow keys). Lines 330 to 400 check to see whether any of the terminal points have been met. A pleasant sound accompanies each terminal meeting.

The positive terminal point of the dry cell is located at screen location 1,186. When this point is met, the program checks to see if all of the other terminals were encountered (connected). If they were connected, the student is assumed to be correct. We say "assumed" because the student could have purposely taken an absurd but nevertheless technically correct path. If, on the other hand, all of the terminals have not been connected, then the student could not possibly be correct. Line 410 checks to see if all of the terminals are connected and reports whether the student is correct.

We hope that you and your children find this program a pleasant way to help introduce the topic of circuits, and we suggest that you help them with it at first. Hopefully, you can help them to build an electrical vocabulary, gain a little knowledge about circuitry and have some fun all at the same time. □

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: CIRCUIT

```

10 REM COMPLETE THE CIRCUIT
20 REM STEVE BLYN, COMPUTER ISLAN
D, STATEN ISLAND, NY, 1987
30 N=1158:REM INITIAL DOT
40 CLS:PRINT@0,"          COMPLETE T
HE CIRCUIT"
50 FOR T=1056 TO 1087:POKE T,255:
NEXT T:REM TOP
60 FOR T=1472 TO 1503:POKE T,255
:NEXT T:REM BOTTOM
70 FOR X=4 TO 14:FOR Y=12 TO 25:
SET(X,Y,3):NEXT Y,X
80 PRINT@291,"dry";
90 PRINT@355,"cell";
100 SET(5,11,7):SET(11,11,7):SET
(5,10,7):SET(11,10,7)
110 POKE 1187,43:POKE 1190,45
120 FOR T=30 TO 40:SET(T,14,3):N
EXT T:REM DRAW THE LIGHTBULBS
130 FOR X=33 TO 37:FOR Y=8 TO 12
:SET(X,Y,5):NEXT Y,X
140 RESET(33,8):RESET(37,8):RESE
T(33,12):RESET(37,12):RESET(33,1
1):RESET(37,11)
150 FOR T=32 TO 38:SET(T,13,2):N
EXT T
160 FOR T=44 TO 54:SET(T,24,3):N
EXT T
170 FOR X=47 TO 51:FOR Y=18 TO 2
2:SET(X,Y,5):NEXT Y,X
180 RESET(47,18):RESET(51,18):RE
SET(47,22):RESET(51,22):RESET(47
,21):RESET(51,21)
190 FOR T=46 TO 52:SET(T,23,2):N
EXT T
200 POKE 1264,43:POKE 1267,45
210 POKE 1431,43:POKE 1434,45
220 POKE N,130
230 EN$=INKEY$
240 IF EN$=CHR$(9) THEN N=N+1
250 IF EN$=CHR$(8) THEN N=N-1
260 IF EN$=CHR$(10) THEN N=N+32
270 IF EN$=CHR$(94) THEN N=N-32
280 REM PROTECT BOUNDARIES
290 IF N<1088 THEN SOUND 100,5:G
OTO 500
300 IF N>1472 THEN SOUND 100,5:G
OTO 500
310 POKE N,130
320 IF EN$=CHR$(13) THEN 420
330 REM CHECK TERMINAL POINTS
340 A=PEEK(1264):B=PEEK(1267):C=
PEEK(1431):D=PEEK(1434):E=PEEK(1
186)
350 IF A=130 THEN POKE 1264,88:SO
UND 200,3

```

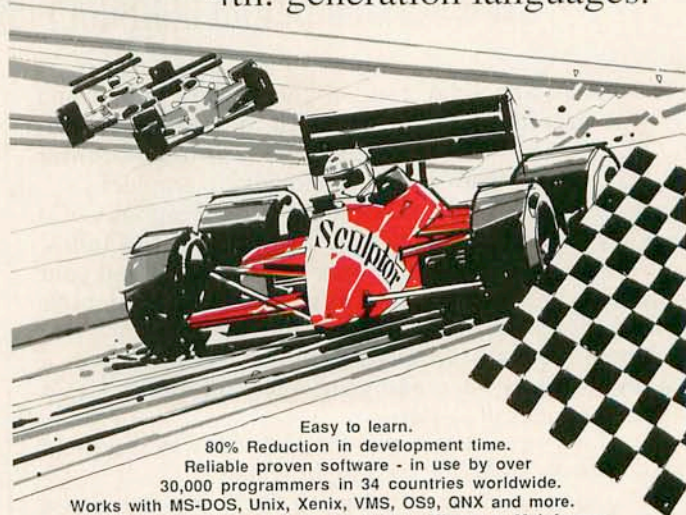
```

360 IF B=130 THEN POKE 1267,88:SO
UND 200,3
370 IF C=130 THEN POKE 1431,88:SO
UND 200,3
380 IF D=130 THEN POKE 1434,88:SO
UND 200,3
390 IF E=130 THEN POKE 1186,88
400 IF E=88 THEN 410 ELSE 230
410 IF E=88 AND A=88 AND B=88 AN
D C=88 AND D=88 THEN 420 ELSE 43
0
420 PRINT@0,"          CORRECT ! "
:GOTO 440
430 PRINT@0,"          SORRY, PLEASE TR
Y AGAIN":GOTO 500
440 EN$=INKEY$
450 IF EN$="E" THEN 520 ELSE IF
EN$=CHR$(13) THEN RUN
460 SET(36,9,1):SET(35,11,1):SET
(50,19,1):SET(49,20,1)
470 FOR T=1 TO 35:NEXT T
480 SET(36,9,8):SET(35,11,8):SET
(50,19,8):SET(49,20,8)
490 GOTO 440
500 EN$=INKEY$
510 IF EN$="E" THEN 520 ELSE IF
EN$=CHR$(13) THEN RUN ELSE 500
520 END

```

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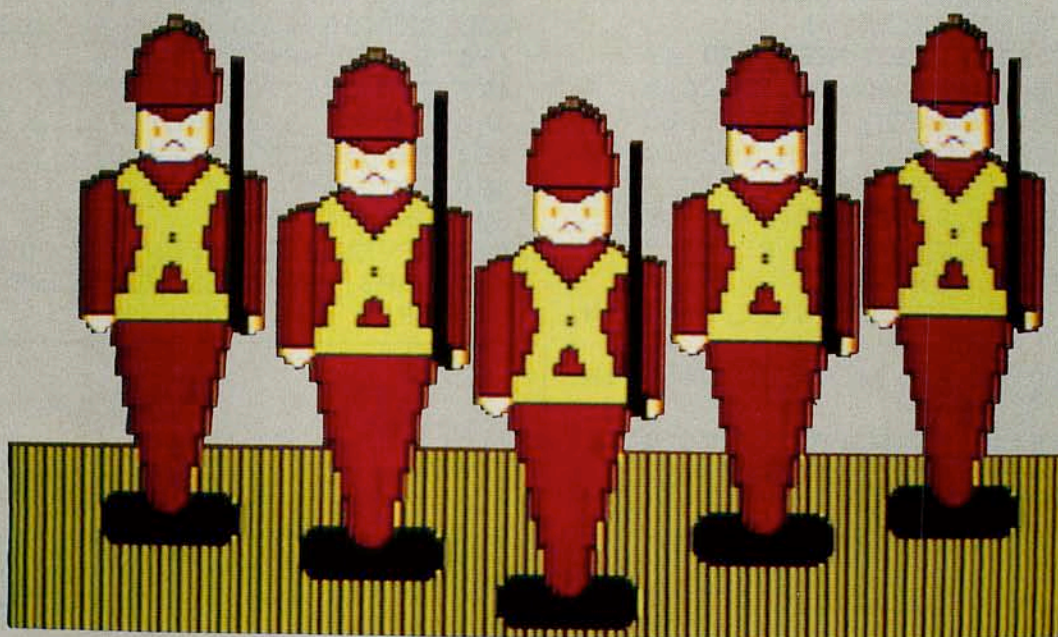
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A Christmas Potpourri

By Ruth E. Golias



Take a holiday tour of the CoCo's sound and graphics capabilities with *A Christmas Potpourri*. The program presents four familiar holiday carols and accompanying graphics.

After a title screen, it's "Up on the Housetop" as CoCo 3 invites you to sing along by providing lyrics that follow the music. Next, five Hi-Res toy soldiers command your attention in a lush graphics treat, drawn with extensive use of the HPAINT and PALETTE commands.

Then hark as the angels sing "It Came Upon a Midnight Clear," and add your voice to theirs as CoCo again furnishes the lyrics.

The final screen leaves you with a holiday message and plays "We Wish You a Merry Christmas."

(Questions or comments may be directed to the author at 2826 Pacific Coast Hwy., Torrance, CA 90505. Please enclose an SASE when requesting a reply.) ☐

Ruth Golias has retired from the Torrance Police Department where she did microfilming. She is learning to program her CoCo and it has become her hobby.

✓	200	.....94	1870	.....17
	390	.....119	2100	.....20
	670	.....157	2270	.....34
	770	.....156	2490	.....4
	1100	.....190	2730	.....121
	1370	.....55	END	.....240
	1680	.....168		

The listing: XMASPORI

```

1 '*****
2 '*   A CHRISTMAS POTPOURRI   *
3 '*                           *
4 '*   RUTH E. GOLIAS          *
5 '* 2826 PACIFIC COAST HIGHWAY*
6 '* TORRANCE, CALIFORNIA 90505*
7 '*****
    
```



```

8 '
9 '***** MERRY CHRISTMAS *****
10 ON BRK GO TO 2960
20 GOSUB 2560
30 HSCREEN2:PALETTE CMP
40 PALETTE 0,40
50 FOR X=1 TO 6
60 HCOLOR 4
70 HDRAW"S8;BM151,60;XAA$;"
80 HDRAW"BM101,80;XX2$;"
90 HDRAW"BM93,130;XX3$;"
100 HCOLOR 3
110 HDRAW"BM152,61;XAA$;"
120 HDRAW"BM102,81;XX2$;"
130 HDRAW"BM94,131;XX3$;"
140 NEXT X
150 FOR D=1 TO 500:NEXT D
160 '
170 '*** UP ON THE HOUSE-TOP ***
180 GOSUB 2560
190 HSCREEN2:PALETTE 0,56:PALETTE 8,8
200 HCOLOR 8
210 HPRINT(8,12)," 'UP ON THE HOUSE-TOP'"
220 FOR D=1 TO 1000:NEXT D
230 HCLS0:HCOLOR 8
240 FOR X=1 TO 2
250 HPRINT(3,1),"UP ON THE HOUSE-TOP REINDEER PAUSE,"
260 PLAY"T3V30;O2L4GL8GAL4GECEL2G"
270 HPRINT(3,3),"OUT JUMPS GOOD OLD SANTA CLAUS;"
280 PLAY"L4AAGEDGL2G"
290 HPRINT(3,5),"DOWN THRO' THE CHIMNEY"
300 PLAY"L4GL8GAL4GL8E"

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310 HPRINT(3,7),"WITH LOTS OF TOYS,"
320 PLAY"DL4CEL2G"
330 HPRINT(3,9),"ALL FOR THE LITTLE ONES,"
340 PLAY"L4AL8AAGGL4E"
350 HPRINT(3,11),"CHRISTMAS JOYS."
360 PLAY"DGL2C"
370 HPRINT(3,13),"HO,HO,HO! WHO WOULDN'T GO!"
380 PLAY"L4FFL2AL4GL8GGL2E"
390 HPRINT(3,15),"HO,HO,HO! WHO WOULDN'T GO."
400 PLAY"L4DFL2FL4EL8GGL4CE"
410 HPRINT(3,17),"UP ON THE HOUSE-TOP,"
420 PLAY"GL8GAL4GE"
430 HPRINT(3,19),"CLICK,CLICK,CLICK,"
440 PLAY"FGL2A"
450 HPRINT(3,21),"DOWN THRO' THE CHIMNEY"
460 PLAY"L4GL8GAGGL4"
470 HPRINT(3,24),"WITH GOOD SAINT NICK."
480 PLAY"L4EDGL2C"
490 FOR D=1 TO 500:NEXT D
500 HCOLOR 0
510 NEXT X
520 HCLS2
530 HCOLOR 4
540 HPRINT(5,10),"HAPPY HOLIDAYS"
550 HPRINT(0,2),STRING$(40,"V")
560 HPRINT(0,21),STRING$(40,"V")
570 FOR D=1 TO 500:NEXT D
580 '

```

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```

590 ***** TOY SOLDIERS *****
600 GOSUB 2560
610 PALETTE 0,5:PALETTE 8,0
620 HSCREEN2:HCLS0
630 HCOLOR 1
640 FOR B=0 TO 320 STEP 3
650 HLINE(B,140)-(B,191),PSET
660 NEXT B
670 A1$="C8;R5F2D3G2L17H2U3E2R5D
1F1FR3E1EU1;U4RU4RU4RU4RU4;L1
7D4RD4RD4RD4RD4;BU24L5G2LH2UR
5DU20L3G2D17;BR5U3R2U3RU3RU3LU3L
U2L2U2;E2RDRDRDRDRDRURURURURUR
URF2D2L2D2L1D3L1D3R1D3R1D3R2D4"
680 A2$="U36R2D33DFD3L1H2BU4BL6L
5U1E1UEBU3URDLBD3R1;FDF1D1BU7BL2
BD13BR11R1E1U2NL2U18HL2BU10BL6F1
D5GNF1LG1L5H1L1NG1HU5E1;F1RF1R3E
1RE1L11;U4EU2EU1ER1E1R1NURNUR1F1
R1FD1FD2FD4L1;BD3BL3DBL5UBD3BR1E
RF"
690 HDRAW"BM70,16;S6;XTT$;BR3;BD
9;XO$;BR8;BU2;XYX$;BR18;BU6;S4;X
SS$;BD12;BR6;S6;XO$;BR8;BD2;XL$;
BR11;BD9;S7;XDD$;BD2;BR3;XII$;BR
9;BD6;S6;XE$;BR9;BD2;XR$;BR4;BD4
;S8;XS$;"
700 HDRAW"S8;BM116,161;XA1$;XA2$
;"
710 HPAINT(116,164),8,8
720 HPAINT(112,166),3,8
730 HPAINT(112,102),3,8
740 HPAINT(94,102),3,8
750 HPAINT(87,102),3,8
760 HPAINT(124,98),3,8
770 HPAINT(128,98),8,8
780 HPAINT(132,98),3,8
790 HPAINT(112,70),3,8
800 HPAINT(112,50),3,8
810 HPAINT(112,55),3,8
820 HPAINT(112,108),1,8
830 PALETTE 4,54
840 HPAINT(110,60),4,8
850 HPAINT(86,114),4,8
860 HPAINT(133,114),4,8
870 '
880 HDRAW"BM174,174;XA1$;XA2$;
890 HPAINT(174,178),8,8
900 HPAINT(170,179),3,8
910 HPAINT(168,114),3,8
920 HPAINT(154,110),3,8
930 HPAINT(148,110),3,8
940 HPAINT(182,110),3,8
950 HPAINT(186,110),8,8
960 HPAINT(190,110),3,8
970 HPAINT(170,86),3,8
980 HPAINT(160,60),3,8
990 HPAINT(166,68),3,8
1000 HPAINT(166,108),1,8
1010 PALETTE 4,54
1020 HPAINT(174,76),4,8
1030 HPAINT(146,126),4,8
1040 HPAINT(192,126),4,8
1050 '
1060 HDRAW"BM232,156;XA1$;XA2$;
1070 HPAINT(228,164),8,8
1080 HPAINT(228,161),3,8
1090 HPAINT(224,95),3,8
1100 HPAINT(204,91),3,8
1110 HPAINT(210,91),3,8
1120 HPAINT(236,86),3,8
1130 HPAINT(244,86),8,8
1140 HPAINT(248,86),3,8
1150 HPAINT(232,65),3,8
1160 HPAINT(228,40),3,8
1170 HPAINT(228,50),3,8
1180 HPAINT(228,90),1,8
1190 PALETTE 4,54
1200 HPAINT(228,57),4,8
1210 HPAINT(206,107),4,8
1220 HPAINT(251,107),4,8
1230 '
1240 HDRAW"BM56,152;XA1$;XA2$;
1250 HPAINT(50,160),8,8
1260 HPAINT(46,157),3,8
1270 HPAINT(48,92),3,8
1280 HPAINT(30,89),3,8
1290 HPAINT(34,89),3,8
1300 HPAINT(65,84),3,8
1310 HPAINT(67,84),8,8
1320 HPAINT(72,84),3,8
1330 HPAINT(46,64),3,8
1340 HPAINT(46,40),3,8
1350 HPAINT(46,46),3,8
1360 HPAINT(46,80),1,8
1370 PALETTE 4,54
1380 HPAINT(46,50),4,8
1390 HPAINT(25,105),4,8
1400 HPAINT(74,105),4,8
1410 '
1420 HDRAW"BM290,148;XA1$;XA2$;
1430 HPAINT(290,156),8,8
1440 HPAINT(284,153),3,8
1450 HPAINT(282,90),3,8
1460 HPAINT(262,90),3,8
1470 HPAINT(268,86),3,8
1480 HPAINT(296,80),3,8
1490 HPAINT(302,80),8,8
1500 HPAINT(305,80),3,8
1510 HPAINT(284,60),3,8
1520 HPAINT(284,30),3,8
1530 HPAINT(280,42),3,8
1540 HPAINT(280,82),1,8
1550 PALETTE 4,54

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1560 HPAINT(290,50),4,8
1570 HPAINT(260,100),4,8
1580 HPAINT(308,100),4,8
1590 FOR D=1 TO 500:NEXT D
1600 PLAY"T2V3002;L8BBBBAAAL4A;L8
GGGGL2B"
1610 PALETTE 0,21
1620 PLAY"L8EEEEDDL4G;L8F#GABL2A
"
1630 PALETTE 0,37
1640 PLAY"L8BBBBAAAL4A;L8GGGGL2B"
1650 PALETTE 0,53
1660 PLAY"L8EEEEDDL4G;L8AGABL2G"
1670 PALETTE 0,5
1680 FOR D=1 TO 500:NEXT D
1690 '
1700 '***** ANGELS SING *****
1710 GOSUB2560
1720 HSCREEN2:PALETTE 0,29:HCLS0
:PALETTE 8,63
1730 HPRINT(12,12),"HARK THE HER
ALD"
1740 FOR D=1 TO 500:NEXT D
1750 B$="XAA$;BR4;XN$;BU1;BR9;XG
$;BU4;BR14;XE$;BR8;BD3;XL$;BR6;B
D7;XS$;"
1760 C$="S6;XSS$;BR4;BD10;S8;XI$
;BR7;BD8;XN$;BR9;BU1;XG$;"
1770 HCOLOR 8
1780 HDRAW"S8;BM70,40;"+B$
1790 HDRAW"BM190,36;"+C$
1800 FOR D=1 TO 500:NEXT D
1810 HPAINT(0,96),0,4
1820 FOR X=2 TO 320 STEP 10
1830 HCIRCLE(X,8),4,8
1840 HCIRCLE(X,184),4,8
1850 NEXT X
1860 HPAINT(0,96),0,4
1870 AN$="R3E2R3E2R3E2R4;E2R4U4H
3U1H3U1H3U1H3;E2U1R2E2U1R2U2
;H2L2;E2U1R2E2U1R2U2;H2L2;E2U1R2
E2U1R2U2;H2L2;E2U1R2U2;H2L2;D1L2
D1L2D1L2D1L2D1L2D1L2D1L2D1L2H2;E
2U1E2U1L2E2U1H3U1L2H1L1;"
1880 AG$="L3H2L3H2L3H2L4;H2L4U4E
3U1E3U1E3U1E3;H2U1L2H2U1L2U2
;E2R2;H2U1L2H2U1L2U2;E2R2;H2U1L2
H2U1L2U2;E2R2;H2U1L2U2;E2R2;D1R2
D1R2D1R2D1R2D1R2D1R2D1R2D1R2E2;H
2U1H2U1R2H2U1E3U1R2E1R2;"
1890 PALETTE 8,63:HCOLOR 8
1900 HDRAW"BM160,140;S4;XAN$;"
1910 HDRAW"BM160,140;XAG$;"
1920 HPAINT(158,120),8,8
1930 HDRAW"BM94,140;XAN$;"
1940 HDRAW"BM94,140;XAG$;"
1950 HPAINT(94,120),8,8

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1960 HDRAW"BM226,140;XAN$;"
1970 HDRAW"BM226,140;XAG$;"
1980 HPAINT(226,120),8,8
1990 FOR D=1 TO 500:NEXT D
2000 PALETTE 0,29
2010 PALETTE 8,63
2020 HCOLOR 8
2030 HPRINT(4,20),"IT CAME UPON
THE MIDNIGHT CLEAR,
2040 PLAY"T2;V25;O2L8GO3L4EL8DDC
O2AL4GL8AL4G"
2050 HPAINT(0,160),0,4
2060 HPRINT(7,20),"THAT GLORIOUS
SONG OF OLD,"
2070 PLAY"L8GABO3CCDEL3D"
2080 HPAINT(0,160),0,4
2090 HPRINT(3,20),"FROM ANGELS B
ENDING NEAR THE EARTH,"
2100 PLAY"O2L8GO3L4EO2L8BO3L8DCO
2AL4GL8AL4G"
2110 HPAINT(0,160),0,4
2120 HPRINT(6,20),"TO TOUCH THEI
R HARPS OF GOLD,"
2130 PLAY"L8GL4AL8ABAGO3L3C"
2140 HPAINT(0,160),0,4
2150 HPRINT(3,20),"PEACE ON THE
EARTH, GOODWILL TO MEN"

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2160 PLAY"L8EL4EO2L8EEF#G#L4AL8B
03L4C"
2170 HPAINT(0,160),0,4
2180 HPRINT(5,20),"FROM HEAV'N'S
ALL GRACIOUS KING."
2190 PLAY"L8EDCO2BABAL3G"
2200 HPAINT(4,160),0,4
2210 HPRINT(4,20),"THE WORLD IN
SOLEMN STILLNESS LAY"
2220 PLAY"L8GO3L4EO2L8BO3DCO2AL4
GL8AL4G"
2230 HPAINT(0,160),0,4
2240 HPRINT(8,20),"TO HEAR THE A
NGELS SING."
2250 PLAY"L8GL4AL8ABAGO3L3C"
2260 HPAINT(0,160),0,4
2270 PALETTE 0,27:FOR D=1TO500:N
EXT D
2280 PALETTE 0,26:FOR D=1 TO 500
:NEXT D
2290 PALETTE 0,25:FOR D=1 TO 500
:NEXT D
2300 PALETTE 0,7:FOR D=1 TO 500:
NEXT D
2310 '
2320 ' MERRY CHRISTMAS
AND HAPPY NEW YEAR
2330 GOSUB2550
2340 HSCREEN2:PALETTE0,7:PALETTE
8,63
2350 HCOLOR 8
2360 HDRAW"BM46,42;S8;XX1$;"
2370 GOSUB2940
2380 HDRAW"BM150,28;XX2$;"
2390 GOSUB2940
2400 HDRAW"BM132,86;XA$;BR3;BD1;
XN$;BR7;XD$;"
2410 GOSUB2940
2420 HDRAW"BM46,150;XHH$;BR3;BU5
;XA$;BR3;BD4;XP$;BR7;BD4;XP$;BR7
;BU5;XY$;"
2430 GOSUB2940
2440 HDRAW"BR16;BU2;XNN$;BR8;BU1
;XE$;BR8;BD3;XW$;"
2450 GOSUB2940
2460 HDRAW"BR10;BU2;XZY$;BR8;BD6
;BD1;XE$;BR9;BU2;XA$;BR3;XR$;"
2470 PLAY"T3;V30;O2L4FB-L8B-O3CO
2B-AL4GGGO3CL8CDCO2B-O2L4AFFO3DL
8DE-DCO2L4B-GL8FFL4GO3CO2AL2B-"
2480 GOSUB2940
2490 PALETTE 0,18:PALETTE 8,63:H
COLOR 8
2500 HDRAW"BM278,182;S4;XRR$;BR1
0;XEE$;BR16;BU3;XGG$;"
2510 PLAY"O2L4FB-B-B-L2AL4AB-AGL
2FO3L4CDL8CCO2B-B-O3L4FO2L4FL8FF
L4GO3CO2AL2B-"
2520 PALETTE 0,23:FOR D=1 TO 500
:NEXT D
2530 PALETTE 0,7
2540 GOTO2540
2550 '*****ALPHABET*****
2560 AA$="U6E3R1F3D3NL6D3"
2570 A$="E1R2F1D5L3H1U1E1R3BD3R1
E1"
2580 B$="U8D4R5F1D2G1L5"
2590 CC$="H1L4G1D6F1R4E1"
2600 D$="U6D4H1L2G1D1F1R4E1"
2610 DD$="U6D4H1L2G1D2F1R4E1"
2620 EE$="L5H1U6E1R5BD4BL1L4"
2630 E$="G1L3H1U4E1R3F1D2L5"
2640 GG$="H1L4G1D6F1R4E1U2L3"
2650 G$="G1L3H1U4E1R3F1D8G1L3H1"
2660 HH$="U8D4E1F1R2E1F1U4D8"
2670 H$="U8D4E1R3F1D4"
2680 I$="R4L2U6L2R4BL2BU3D"
2690 II$="R2L1U5L2R3BL2BU2U"
2700 L$="R3L1U8L2"
2710 MM$="U8F2R1D1U1R1E2D8"
2720 M$="D5U6R2F1D5U5E1R1F1D5"
2730 NN$="U8D1F5E1U5D8"
2740 N$="U6F1E1R2F1D5"
2750 OO$="U4E1R3F1D4G1L3H1"
2760 O$="U4R4D4L4"
2770 PP$="U8E1R4F1D3G1L4"
2780 P$="U9D1E1R2F1D3G1L3"
2790 RR$="U7E1R4F1D2G1L4R1F4"
2800 R$="U6D1F1E1R1F1"
2810 SS$="F2R3E2U2H2L3H2U2E2R3F2
"
2820 S$="F1R2E1U1H1L2H1U1E1R2F1"
2830 TT$="U8NL3R3"
2840 T$="G1L1U8D2L3R6"
2850 U$="U5;BD5;F1;R3;E1;U5"
2860 W$="BU6D5F1R1E1U5D5F1R1E1U5
"
2870 YY$="D4F1R3E1U4D8G1L3H1"
2880 ZY$="D2F2R2D4U4R2E2U2"
2890 Y$="D2F1R4U3D5G1L3H1"
2900 X1$="XMM$;BR8;BU1;XE$;BR8;B
D3;XR$;BD4;BR2;XR$;BD4;BR2;BU6;X
Y$;" 'MERRY
2910 X2$="XCC$;BR3;BD1;XH$;BR3;X
R$;BD4;BR2;XI$;BR2;BD7;BR3;XS$;B
R7;BD4;XT$;BR3;BD1;XM$;BR4;BU5;X
A$;BR3;XS$;" 'CHRISTMAS
2920 X3$="XPP$;BD2;BR8;XOO$;BR12
;XT$;BD9;BR3;XP$;BR7;XOO$;BR4;BR
4;XU$;BD6;BR3;XR$;BD4;BR3;XR$;BD
4;BR2;XI$;" 'POTPOURRI
2930 RETURN
2940 FOR D=1 TO 200:NEXT D
2950 RETURN
2960 PALETTE CMP:HSCREEN 0:WIDTH
32:CLS

```


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By Larry
Anderson

Would you like to cross-stitch, even if you can't thread a needle? With *Counted Cross-Stitch*, you can simulate cross-stitchery in your choice of 15 different colors. It's your creative doodler with a flair.

For the dedicated craftsperson, new ideas for cross-stitch designs can be tried, altered, assigned different colors, and, if desired, photographed on the monitor screen. (I am leaving it to a more ambitious programmer to create a 16-color graphics dump to capture the graphics on paper.)

Here's how it works. The CoCo 3 is put into the 16-color graphics mode, and a help screen is displayed. Pressing any key advances you to the work area, with its grid of reference dots and overhead color chart. Your cursor is the small dot in the middle of the screen (you can see it better by moving it with the arrow keys). Position it where you will begin to "stitch," and press the

space bar. This makes the characteristic X-shaped stitch in the default color, black. Other colors are also available at any time. Simply type C followed by a number between 0 and 14, and you will see the cursor change to the color of your choice. Move around the screen and try a few stitches.

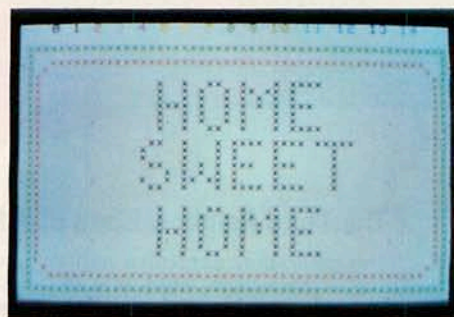
Want to move in larger jumps? Just hold down the ALT key when you use the arrow keys. Your moves will be 10 times greater, allowing you to get around the screen in a hurry. Do you want to erase the stitch you just made? Type D and it will be gone. Any other stitch can be removed by moving the cursor over it, pressing the space bar and typing D.

When you tire of one design and want to move on to another one, pressing the ESC/BREAK key gives you the choice of erasing or quitting. Erasing lets you start fresh, while quitting lets you exit to BASIC.

Here's the program's structure. Line 30 sets the 16-color Hi-Res graphic mode, and lines 40 through 80 establish the help screen. Line 90 sets initial foreground and background colors and cursor position. Then the palette is reloaded with different color assignments (you are welcome to change these codes, which are in Line 390 as data). Line 130

sets the workspace to color code 63 for a neutral background. Then lines 140 through 170 print the color chart and a grid of dots for reference.

Foreground and background colors are initialized to 0 and 15 (remember Line 90?) and the cursor is placed on the screen in lines 180 and 190. Line 200 looks for a keystroke and blanks out the cursor dot when it sees a key pressed. The cursor will move a standard displacement unless the ALT key is also pressed, in which case the displacement increases tenfold — see lines 210



through 250. If the C is typed, lines 340 and 380 assign the foreground color by your next (numeric) keystrokes. If D is selected, lines 320 and 330 cause the stitch to be redrawn in the background color, making it invisible, and effectively erasing it.

Larry Anderson is an auto mechanic and electronics instructor who lives in Benton, Louisiana, with his wife, Linda, and their 13-year-old daughter, Kacy. He holds a degree in English, and his interests include photography and cooking.

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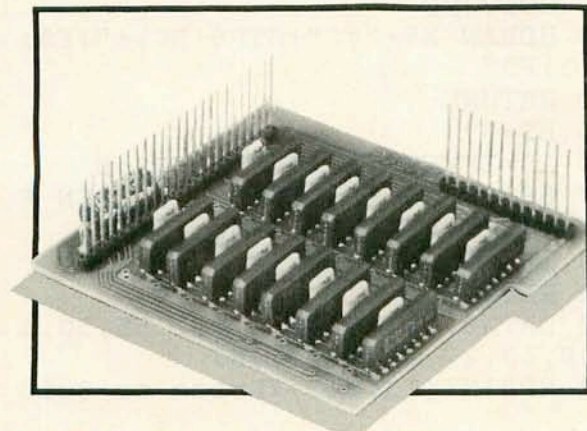
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Line 270 relocates the cursor according to the foregoing (note that it is offset by one dot to avoid changing an X that you may move it through). If you press

the space bar, an X-shaped character is drawn by lines 280 through 300 in the specified foreground color.

Now let's get busy cross-stitching!

(Questions may be directed to the author at 202 Jackson St., Benton, LA 71006. Please enclose an SASE when requesting a reply.)

80	.....212
180	.....233
300	.....139
END	.....232

The listing: XSTITCH

```

1 *****COUNTED CROSS-STITCH*****
2 *****GRAPHICS PROGRAM FOR*****
3 *****THE COCO 3 *****
4 *****BY LARRY ANDERSON*****
5 *****PO BOX 180 *****
6 *****BENTON, LA 71006*****
7 *****COPYRIGHT 1987*****
8 '
9 '
10 '
11 ONBRK GOTO 400
12 HSCREEN2
13 HCLS5
14 HPRINT(11,10),"COUNTED CROSS-
15 STITCH"
16 HPRINT(4,12),"Space bar marks
17 the stitch":HPRINT(4,13),"Arrow
18 keys move the cursor dot":HPRIN
19 T(4,14),"ALT-arrow multiplies cu
20 rsor movement"
21 HPRINT(4,15),"C and 2 digits
22 sets stitch color":HPRINT(4,16),
23 "D deletes the current stitch":H
24 PRINT(4,18),"(delete any stitch
25 by moving to it,":HPRINT(4,19),"
26 press SPACEBAR and then D)"
27 A$=INKEY$:IFA$="" THEN80
28 FG=0:BG=15:X=162:Y=90
29 100 FOR SL=0TO15:READ CL:PALETTE
30 SL,CL
31 110 NEXT SL
32 120 RESTORE
33 130 HCLS15
34 140 HCOLOR 0,15:HPRINT(3,0),"0":
35 HCOLOR 1,15:HPRINT(5,0),"1":HCOL
36 OR 2,15:HPRINT(7,0),"2":HCOLOR3,
37 15:HPRINT(9,0),"3":HCOLOR4,15:HP
38 RINT(11,0),"4"
39 150 HCOLOR5,15:HPRINT(13,0),"5":
40 HCOLOR6,15:HPRINT(15,0),"6":HCOL

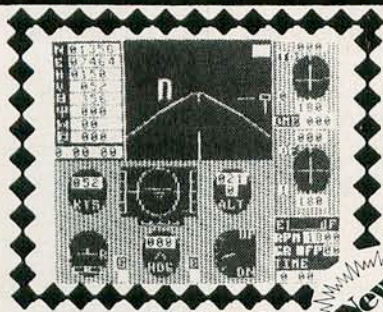
```

```

OR7,15:HPRINT(17,0),"7":HCOLOR8,
15:HPRINT(19,0),"8":HCOLOR9,15:H
PRINT(21,0),"9"
160 HCOLOR10,15:HPRINT(23,0),"10"
170 HCOLOR11,15:HPRINT(26,0),"11":
180 HCOLOR12,15:HPRINT(29,0),"12":HCOL
190 OR13,15:HPRINT(32,0),"13":HCOL
200 OR14,15:HPRINT(35,0),"14"
210 170 FOR L=1TO320STEP54:FOR M=30T
220 O190STEP40:HSET(L,M,0):HSET(319,
230 M,0):NEXT M,L
240 180 HCOLOR FG,BG
250 190 HSET(X+1,Y,FG)
260 200 A$=INKEY$:IFA$=""THEN200 ELS
270 E HRESET(X+1,Y)
280 210 D=6:E=5
290 220 IFPEEK(341)=191 OR PEEK(341)
300 =183 THEN E=40:D=54
310 230 IF ASC(A$)=8 THEN X=X-D ELSE
320 IF ASC(A$)=9 THEN X=X+D ELSEIF A
330 SC(A$)=10 THEN Y=Y+E ELSEIF ASC(
340 A$)=94 THEN Y=Y-E
350 240 IFX<0THEN X=0 ELSE IF X>318
360 THEN X=318
370 250 IFY<0THEN Y=0 ELSE IF Y>190T
380 HEN Y=190
390 260 IFA$="C"THEN GOSUB340:ELSEIF
400 A$="D" THENGOSUB320
410 270 HSET(X+1,Y,FG)ELSEGOTO200
420 280 IFA$=CHR$(32)THEN 290ELSE 20
430 0
440 290 X$="BM"+STR$(X)+",""+STR$(Y)+
450 ";"
460 300 HDRAW X$+";C"+STR$(FG)+";E3;
470 B;L3;F3"
480 310 GOTO200
490 320 HDRAW X$+";C"+STR$(BG)+";E3;
500 B;L3;F3"
510 330 RETURN
520 340 B$=""
530 350 A$=INKEY$:IFA$=""THEN350
540 360 B$=B$+A$:IF LEN(B$)=2 THEN F
550 G=VAL(B$) ELSE GOTO350
560 370 IF FG>15 THEN FG=0
570 380 RETURN
580 390 DATA0,32,39,60,47,52,55,50,1
590 6,20,48,27,29,10,57,63
600 400 HPRINT(13,24),"Erase or Quit
610 ?"
620 410 A$=INKEY$:IFA$=""THEN410
630 420 IFA$="Q"THEN PALETTE RGB:NEW
640 :ELSEGOTO90
650 430 A$=INKEY$:IFA$=""THEN430ELSE
660 PRINTASC(A$)::PRINTPEEK(341)::GO
670 TO430

```


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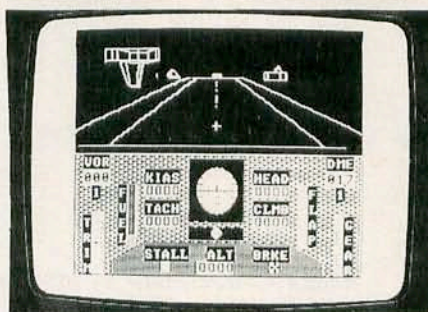
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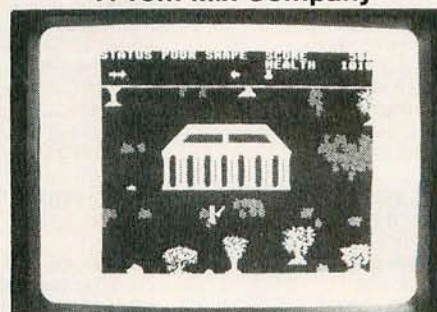


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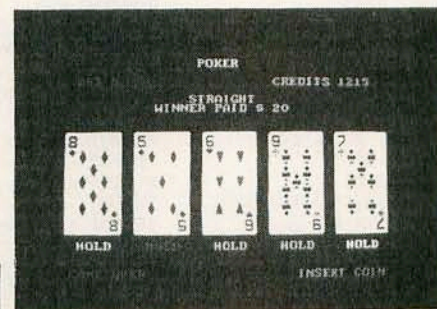


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WE'RE BRINGING THE COCO

RAINBOW'S BROADENING ITS SPECTRUM

THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has a **special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send \$25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged \$3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a **free lifetime subscription to Delphi** — a \$24.95 value — and a free hour of connect time — a \$7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this \$32.15 value as a **free bonus!**

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our \$31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

Want to save even more? While you're online you can order, for only \$29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* (\$21.95) and a total of three hours of connect time (\$21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

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DELPHI

TYPE: GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional \$10.80 (U.S.) per hour.

On Telenet: Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type C DELPHI and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type DELPHI and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type SET 2:1, 3:126 and press ENTER. Now type p 1 3106, DELPHI; and press ENTER. Delphi's new rates indicate an additional \$10.80 hourly surcharge for evening use of Datapac, which means a total of \$18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the

"USERNAME:" prompt, type JOINDELPHI and press ENTER. At the "PASSWORD:" prompt, type RAINBOW. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type JOINDELPHI and press ENTER. At the "PASSWORD:" prompt, type SENDRAINBOW and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type HELP to get help on how to use the system. To get off the system just type BYE.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

Come Visit Us! Type: GROUP COCO

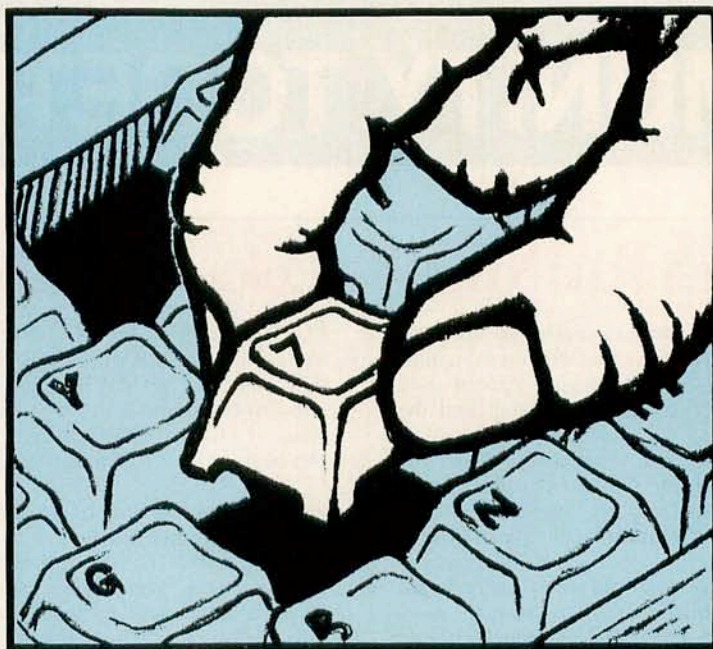
After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in GROUP COCO and **join us on the CoCo SIG!**

Customizing Your Keyboard



By Allen Drennan

One of the Color Computer's best but least known features is its ability to customize the keyboard keys. Problems that arise in everyday life for the CoCo user now can be solved with a simple poke. How many times have you accidentally pressed the CLEAR key instead of the ENTER key, or pressed the BREAK key in the middle of a program? You can save yourself some grief and prevent these accidents from ruining your life by using the CoCo's special character table.

The CoCo's special character table is situated between locations 41582 and 41601 in memory. This character table defines the ASCII value generated when certain keys are pressed. For instance, the CLEAR key, when pressed, produces the ASCII value 12, which is sent to the

computer. The computer recognizes 12 to be the ASCII value to clear the screen; therefore, the screen is cleared by pressing the CLEAR key. The same is true for the ENTER key. The ASCII value of the ENTER key is 13, and it sends a 13 to the computer when pressed. Twenty different keys and their corresponding values are held in the keyboard special character table.

If we were to type `PRINT PEEK(41594)`, the computer would respond with the value 13. This is true only because location 41594 holds the ASCII value of the ENTER key. If we attempted to poke location 41594 with anything else, it would not work, because we cannot change the values of ROM (Read Only Memory). If we could convert this ROM to RAM (Random Access Memory), we could change the value of location 41594.

The exception to the above is the CoCo 3. Since ROM is copied into RAM when the machine is first turned on, you won't need to be concerned with doing it later. The changes outlined in this article can be made as soon as the

machine is powered up.

Listing 1 is a short program that will copy ROM to RAM so it can be changed. After the program is run, the contents of location 41594 and all others in the keyboard special character table can be altered. Listing 1 will work only if your Color Computer is running at 64K.

The special character chart lists all of the keys in the CoCo's special keyboard character table. If we were to type `PRINT PEEK(41590)` (one of the values in the first column), the computer would respond with the value 32 (the number corresponding to 41590 in the second column). If we were to run Listing 1 and type `POKE 41590,12`, pressing the space bar from that point onward would clear the screen. We redefined location 41590, which was the space bar, to the same value held by the CLEAR key. So now every time the space bar is pressed, the screen clears. Obviously, this example serves no useful purpose, but changing other values in the table can make life extremely easy for the CoCo user.

Allen Drennan has been programming in BASIC, PASCAL and assembly language for nine years. At 17, he holds a degree in PASCAL programming, and is currently enrolled as a senior at Sonora High School, living in Sonora, CA.



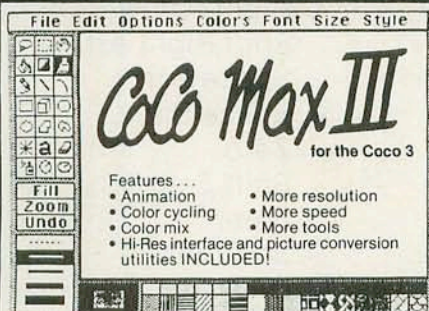
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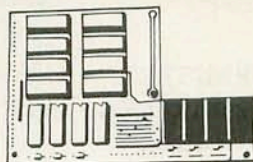
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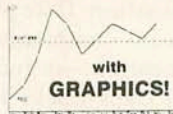


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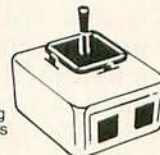
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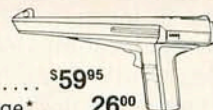


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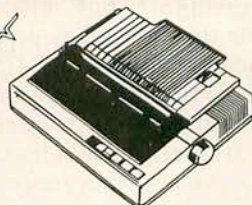
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Easier Pausing

If you ever tried to stop in the middle of listing a program, you know how hard it sometimes is to get the CoCo to pause. Part of the problem is that nasty combination keystroke of SHIFT and @, which is slow and cumbersome and hardly worth the effort. To remedy this problem we must redefine another key to the pause key. I chose the down arrow key to become the pause key simply because it is rarely used and rather convenient.

To change the down arrow key to a pause key, look for the location of the down arrow in the keyboard special character chart. The location is 41584, which contains the value 10. Then we look up the value contained in the shifted-@ location. That value is 19, which is at location 41601. Typing POKE 41584,19 will change the down arrow to a pause key, leaving all other keystrokes intact, including the shifted-@ combination. In simple terms, we took the value of the shifted-@ key and gave it to the down arrow key.

Disabling the BREAK Key

I have seen many methods for disabling the BREAK key, but none prove to be as simple and reliable as this one. Other methods work only part of the time (sometimes they quit working during input), but this method will disable the BREAK key permanently.

Locations 41598 and 41599 hold the values of the BREAK key and the BREAK and shifted-BREAK respectively. Those who are tired of accidentally pressing the BREAK key while running a program might consider just altering location 41598, leaving location 41599 intact — pressing shifted-BREAK will stop the computer, and BREAK by itself won't function.

Those who want copy protection and total control over the BREAK key might consider altering both locations. Since the ASCII table ranges from values 0 to 255, and since only values smaller than 128 can be accessed through the keyboard, any value above 128 can be used as a garbage value. Therefore, if we type

The Keyboard Special Character Table

Location	Value	Key Press
41582	94	Up Arrow
41583	95	Shift Up Arrow
41584	10	Down Arrow
41585	91	Shift Down Arrow
41586	8	Left Arrow
41587	21	Shift Left Arrow
41588	9	Right Arrow
41589	93	Shift Right Arrow
41590	32	Space Bar
41591	32	Space Bar
41592	48	Zero
41593	18	Shift Zero
41594	13	Enter
41595	13	Shift Enter
41596	12	Clear
41597	92	Shift Clear
41598	3	Break
41599	3	Shift Break
41600	64	@
41601	19	Shift @

The listing:

```

10 REM ROM TO RAM TRANSFER
20 FOR I=32000 TO 32025:READ A:P
OKE I,A:NEXT I:EXEC 32000
30 DATA 26,80,142,120,0,236,132
40 DATA 183,255,223,237,129,183
50 DATA 255,222,140,254,255,37
60 DATA 241,183,255,223,28,175,5
7

```

POKE 41598,255 and POKE 41599, 255, or just one of those two pokes (depending on which we prefer), we can redefine the BREAK key from ASCII value 3 to ASCII value 255 and render the BREAK key useless to anyone accessing the keyboard.

That Nasty CLEAR Key

The CLEAR key is so close to the ENTER key that you sometimes might accidentally press it instead of the ENTER key. The following poke will solve that problem. Location 41596 holds the value 12 and the CLEAR key. If we type POKE 41596,13, the same value as the ENTER key, we redefine the CLEAR key so that it acts as the ENTER key.

A Caps-Lock Key

Last, and one of my favorites, is the

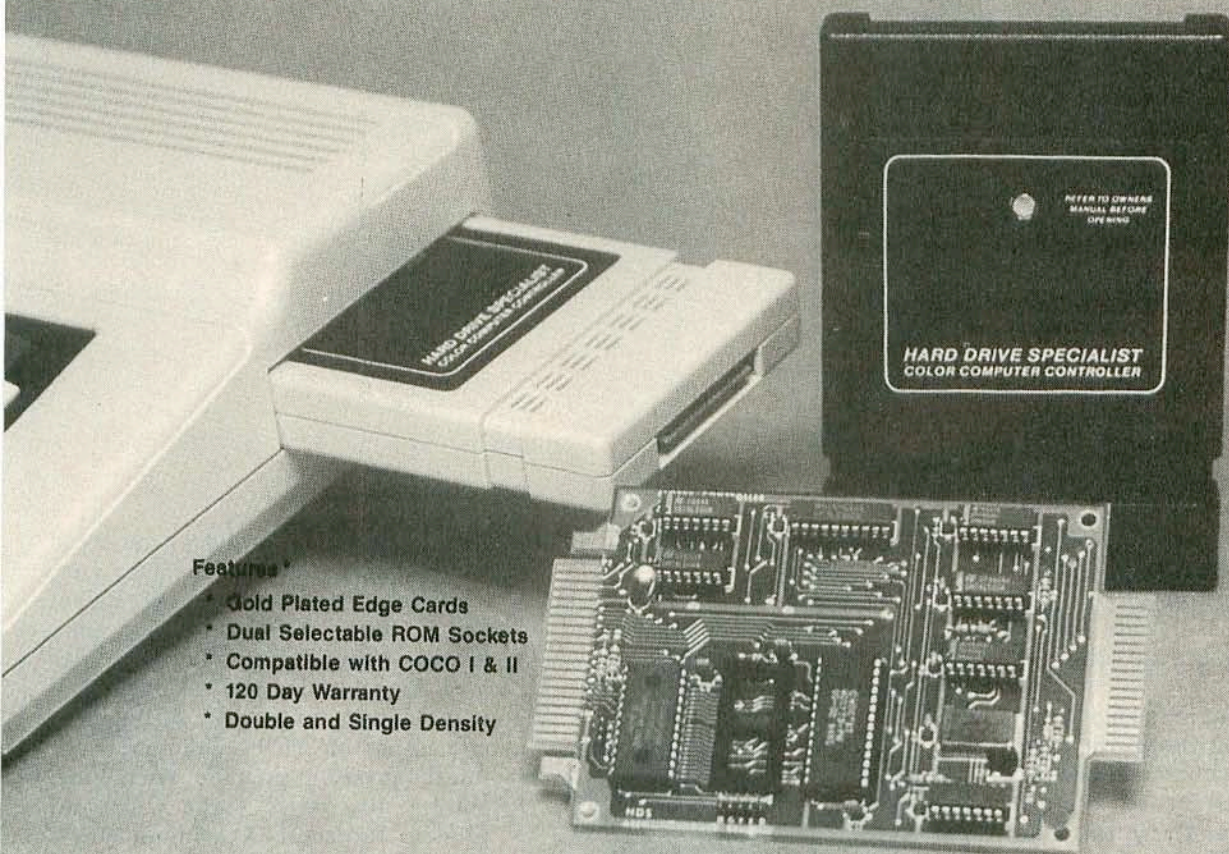
ability to create a Caps-Lock key. Once again I decided to use the down arrow key as my victim. Shifted-0, in effect, is a Caps-Lock combination. If we put the value of the shifted-0 combination in the down arrow location, we turn the down arrow into a Caps-Lock. This is accomplished by typing POKE 41584, 18. This is a handy little feature that everyone will enjoy.

Experiment on your own with the different keys in the table and decide what you like best. The four examples above are just a few of the many different possibilities you can explore. For further information, look up the ASCII table in your Color BASIC or Extended Color BASIC manual.

(Questions may be directed to the author at 15485 Paseo de Los Robles, Sonora, CA 95370. Please enclose an SASE when writing for a reply.) ☺

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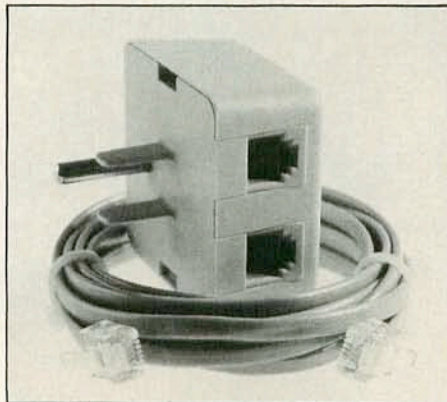
DISK UTILITY Sunrise Software has announced the release of *Superdisk +3*, a multiuse utility program for your CoCo. It contains software for the CoCo 1 and 2, plus a special edition for the CoCo 3.

Superdisk +3 may be added to any disk. It lists disk directories in pages, runs any program with two keystrokes, creates a spare directory, restores crashed directories and performs many other tasks. *Superdisk +3* costs \$19.95 plus \$2 S/H. Contact Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322, (800) 628-2828.

DEVELOPMENTS Radio Shack has released the *OS-9 Development System* for the Color Computer 3. This system is a complete editor/assembler with full-screen editing and specialty I/O drivers. The development system gives serious, as well as novice, Color Computer programmers tools to develop software programs for their own customized applications. In addition, the package includes several new commands that are useful for creating a multiuser environment as well as drivers for external devices such as hard drives.

The OS-9 Level II operating system is required to take advantage of programming tools provided by the development system. The package (Cat. No. 26-3032) retails for \$99.95 and is available at Radio Shack stores nationwide.

STOP THE FLOW Kalglo Electronics has introduced a new model telephone-line/modem voltage surge protector.



The Model TLP-2 from Kalglo Electronics.

Designated the Model TLP-2, it plugs into any standard three-prong AC wall outlet and provides convenient modular phone jacks and interface modular phone cables to connect and protect your computer's modem from voltage surges and lightning spikes on the telephone line. Capable of dissipating up to 6,000 v at 14,000 amps, the device discharges high energy surges safely to the ground wire of your electrical system. The TLP-2 utilizes both MOV and gas discharge technologies and is capable of reacting within 1 nanosecond to clamp off spikes harmlessly. The TLP-2 unit costs \$39.95. Contact Kalglo Electronics Co. Inc., 6584 Ruch Road — East Allen Township, Bethlehem, PA 18017-9359, (800) 524-0400.

ACQUISITIONS Kensington Micro-ware Ltd. has announced that they have acquired the Networx line of surge suppression products. The Networx

family of products includes a variety of surge suppressors from the Power Tree, an outlet strip with a suggested retail of \$29.95, to the Wire Tree Plus, a more advanced surge suppressor with EMI/RFI noise filtering and telephone line surge suppression, with a suggested retail price of \$99.95. Other Networx family products include Wire Tree, Wire Cube, Wire Cube Plus and Modem Protector. Kensington products are available through computer stores nationwide. For the name of the dealer nearest you, contact Kensington at (800) 535-4242. In New York, call (212) 475-5200.

CONGRATULATIONS Anchor Automation, a manufacturer of modems for PCs, recently announced the shipment of the company's millionth modem. George Eisler, president and founder, said, "This marks a significant milestone for Anchor Automation, and for the whole industry. Back in 1980 when the company was founded, no one could accurately foresee the demand for computer communications that has materialized. We are grateful to have played a major role in the industry's growth."

Anchor Automation, a privately held California corporation, manufactures the Signalman and Volksmodem product lines. Their modems, available from 300 to 2400 baud, are distributed by more than 1500 dealers. For further information, contact Anchor Automation, 20675 Bahama Street, Chatsworth, CA 91311, (818) 998-6100.

The Times Are A-Changin'

By Cray Augsburg
Rainbow Technical Editor

Delphi is a continually changing information system. This is why most users find the system gets easier and easier to use. Rather than set the system up a certain way and never allow any room for change, Delphi listens to its users and makes changes the users would like to see.

Call it a self-honing process, if you will. The point is, the end users of the system give the SIG staff feedback regarding certain aspects of the SIG operation. While most of the changes required cannot be performed by us, but must be performed by Delphi service, we do use that information to show Delphi what changes are needed. They usually follow through.

In addition, the people who work for Delphi and the SIG staff are continually searching for other ways to improve the system. For example, as **Don Hutchison** (DONHUTCHISON) explains in the Database Report, he recently took a long, hard look at how the graphics area of the database was arranged. All graphics files were put under one topic regardless of the machine and/or software for which they were intended. Don suggested some changes to the rest of the SIG staff, everybody put in their "two bits," and now the graphics database has been split in two. This makes finding graphics images for your specific machine much easier.

"What am I getting at?" you might

Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is CRAY.

ask. I am suggesting that you make RAINBOW's Delphi CoCo SIG your very own. If you see something you feel should be altered, *let us know!* Sometimes we might have a good reason for not wanting to change something, but no suggestion is too small for us to take a little time to consider. To make your suggestions known to the SIG staff, just

use the Feedback to SIG Staff selection in the Rainbow Magazine Services menu. Again, we welcome any information that would make Delphi use more convenient.

Database Alterations

Speaking of making changes to the system, Delphi has recently made some

Database Report

In order to provide greater convenience for our users in the CoCo SIG, we have split the former Graphics topic of the database into two topics, namely "CoCo 3 Graphics" and "Classic Graphics." The Classic Graphics topic will contain graphics utilities and PMODE 3 and 4 graphic images that may be displayed on a CoCo 1, 2 or 3; the CoCo 3 Graphics topic will contain graphics and utilities that are specific to the CoCo 3.

We will also be creating an Archives topic in the database that will contain archived Forum threads and other information that should be retained in a database topic. Look for this topic in the next few weeks.

OS-9 Online

In the General Information topic area, **Steve Clark** (STEVECLARK) uploaded his

Don Hutchison is an electrical engineer and lives in Atlanta, Georgia. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

program that puts "OS-9" in giant letters on an 80-column text screen.

In the Users Group topic area, **SIGop Greg Law** (GREGL) posted a description of the User Group files in a text file that's already formatted and printer-ready; *Sled*, a full-screen text editor for CoCo 3 OS-9 Level II that also supports windows; *NROFF*, a Unix-style print formatter; *DATELIB*, a Julian date conversion utility; *Dates*, to keep track of dates, appointments, birthdays, etc., and warn if they are coming up; and *D*, a directory utility similar to *LS* that lists one file per line with wildcards.

In the Utilities topic area, Greg Law posted *Alarm*, which allows one to set, display, or clear an alarm using the new `F$Alarm` call (the program is courtesy of Dan Robins). Greg also uploaded *SYSINFO*, a BASIC09 procedure that can be used in other programs or as a stand-alone assembly version to display the window number, screen type, window size, current foreground, background, and border palette register numbers, and a list of all 16 current palettes and the colors contained therein. (*SYSINFO* is also courtesy of Dan Robins.) **Rick Adams** (RICKADAMS) uploaded *CC2* for those with Level II, 512K and the C compiler. This implementation

which should make downloading specific files much easier. When looking for certain types of files in the different database topic areas, most people find it convenient to use the SEARCH command. In the past, entering this command took you to a "mini" menu from which you could start the search for specific keywords. Delphi has altered this so you no longer go to the other menu. Rather, entering SEARCH at the DBASES prompt automatically clears any previous search keywords and begins a new search.

To supplement the search process, the NARROW and WIDEN commands, which used to reside in the Search menu, have also been placed on the DBASES menu. The NARROW command allows you to "fine tune" the search. Obviously, then, WIDEN allows you to make a broader search than you had originally intended when you issued the SEARCH command.

In addition, you can get a list of keywords used to help you in narrowing a search by typing a question mark at the keyword prompt. Actually, you will

have to enter two question marks since the first one you enter will call the help screen for the NARROW command. The only keywords that will be in the list will be those that match at least one of the keywords used to describe at least one of the files already selected by the SEARCH command.

This may seem a little confusing, but it is really quite easy to understand. Let's assume you are at the DBASES prompt for the Utilities and Applications topic. You have a CoCo 3 and all you are interested in are programs intended for that machine. So, you type SEARCH and press ENTER. When prompted for the keyword to search on, you enter COCO3. Now, the search routine will go through all the groups of files in the database, looking for any which have COCO3 as a keyword. All such files will then be considered "selected." From that point on, only those groups will be "active" whenever you enter DIR or READ.

Now, if you are looking for filing programs, you might want to narrow

the search a bit. Simply enter NARROW. When prompted for the keyword to narrow the search, enter a question mark. After the help screen explains the NARROW command, enter a second question mark. You will see a complete list of the keywords used in the groups you selected. You might see one that is related to filing programs. Simply enter the appropriate keyword and the search will be narrowed. Any selected files that do not contain that keyword will be deselected.

When you have found the file you are looking for, you can then download it. Once the program is downloaded, you might want to search for something else. Simply enter SEARCH again and the present search keywords will be cleared. At this point, you can enter another keyword or, if you just want to look at the directory of all groups in the topic area, simply press CONTROL-Z. If you should use SET to choose a different topic area of the database, all SEARCH parameters are also reset. To repeat, the SEARCH parameters you choose one

of CCI combines the C.PREP, C.PASS1, C.PASS2 and C.OPT steps via pipes, and has many options. Most of these are identical in function to the CC2 command that is described in the C compiler manual but non-existent on the C compiler disks.

In the Applications topic area, **Mark Sunderlin** (MEGABYTE) uploaded his phone "words" generator program that generates easy-to-remember mnemonic names from phone numbers. This program prints out all possible "words" that a given phone number creates. (Example: 667-5263 is 667-MALE.)

In the Patches topic area, Greg Law furnished a text file that describes a bug and the fix for RMA Version 1.1 as supplied with the OS-9 Level II Developers System. It corrects a minor bug in the listing format when using the "-l" option.

In the Telecommunications topic area, **Bill Brady** (WBRADY) uploaded WIZUP.TXT, a report of problems that people have had with his terminal program, *The Wiz*.

In the Graphics and Music topic area, **Ray McCopin** (RAYMCCOPPIN) uploaded ICE.AR, an icon editor for OS-9 Level II with 512K. It features full-screen editing of icons and patterns for use in other programs.

CoCo SIG

In the CoCo 3 Graphics topic area, **Michael Schneider** (MSCHNEIDER) uploaded three more adult conversions from Atari ST pictures as well as MGE pictures of Marilyn Monroe. I posted several more

MGE pictures, including a revised picture of Little Red Riding Hood, a nude shot of Elvira, a version of the three Microware programmers, a sample of the works of Ron Kiyomura converted to MGE format, and a few other conversions from Ana Landa's PMODE 4 graphics. **Richard Trasborg** (TRAS) posted an adult picture called "Charla" and a grouping of three MGE nudes drawn by Mike Trammell. **Victor Ricker** (JACKRIPPER) provided an outstanding utility for viewing ST pictures in "Tiny" format on a CoCo 3. (This utility is written in machine language and is very fast.) **Bob Wharton** (BOBWHARTON) uploaded a picture from the movie *Top Gun*, and **Michael Fischer** (MIKE88) uploaded a picture of the logo for Carnegie Mellon University. **Noel Fallon** (FALLON) graciously furnished four of his original drawings in an Oriental grouping.

In the Classic Graphics topic area, Victor Ricker sent us a fine utility for viewing Koala pictures on a CoCo PMODE 4 screen. **Earl Knutson** (BJORKKNUTSON) provided the program called *Graffiti* that adds legends to CoCo 1 graphics screens. Since the program required Dick White's copyrighted character generator, **Dick White** (DICKWHITE) then provided the character set from his program to complete the program. **Ana Landa** (ANA) posted a second gallery collection of her PMODE 4 artwork, drawn using *Graphicom*. **Jason Forbes** (COCO3KID) sent us some more digitized Max pictures. I posted a text file describing the format for RLE-encoded picture files.

In the Source for 6809 Assemblers topic area, I provided the source code for a fast disk initializer for the CoCo 1 and 2. **Roger Krupski** (HARDWAREHACK) provided the source code to his *Copy* command enhancement program and the source code for the CoCo 3 character set. **Doug Masten** (DMASTEN) uploaded a popular fast disk duplicating utility for the 512K CoCo 3.

In the Utilities and Applications topic area, Richard Trasborg uploaded a fine VCR cataloger program for the DMP-105 Tandy printers. Richard's program will catalog over 2,000 tapes, and will work on all CoCos. **John Malon** (JOHNLM) uploaded a disk directory utility that will print an organized directory listing, optionally sorting the directory in alphabetical order. Roger Krupski supplied his *CoCo 3 Super Patch*, a complete CoCo 3 enhancement program that fixes all the known bugs in Super Extended Color BASIC and adds several new commands and functions. It is written for the CoCo 3 under Disk Extended Color BASIC Version 2.1 only. Michael Fischer sent us a BASIC program for comparing the lengths of individual files versus their archived length. **Craig Shelton** (JAYBACK) provided us with *LCSCREEN* to set newer CoCo 2s to true lowercase when in the 32-column mode. Michael Schneider uploaded *TC3*, the CoCo 3 version of the very popular *The Compressor* program by John Lauro for ARcing and un-ARcing files.

In the Hardware Hacking topic area, I posted a description of a bug in disk BASIC and a fix for it. This bug pertains to the

time are erased if you leave the database or log off the system. They are not permanent.

Keep in mind that the **SEARCH** command is on the **DBASES** menu, which means you can no longer type **SE GRA** to change to the graphics database topic. In fact, the way Delphi has arranged the priority of the two commands, entering **SE** will cause the system to default to **SEARCH**. To change topic areas, you must enter **SET**.

In addition to the **SEARCH** changes above, Delphi has done quite a bit toward making downloading easier. Until now, the **DOWNLOAD** command (abbreviated **DO**) has been used only for buffer capture downloads. You would use the commands **XMODEM**, **KERMIT** or **YMODEM** instead for an error-checking download. Now that Delphi supports so many file transfer protocol variations, however, they have consolidated these commands into a new **DOWNLOAD** command. The first time you use **DOWNLOAD** after logging in, you will get a menu of the different transfer techniques available. Pick the one you normally use. If the transfer is successful, your choice will be remembered for the rest of the session. For most CoCo users, the chosen protocol will be **Xmodem**. But first, make sure your terminal software supports this protocol.

It is also possible to bypass the Download menu. You just need to enter the chosen method on the same command line with **DOWNLOAD** command (e.g., **DO XM**). If you want to download only the third file in a group, you would enter **DO 3 XM**.

If you consistently use a particular file transfer protocol (often the case with the CoCo), you can make that your default selection by using profile com-

mands. Entering the following two lines will cause the **DOWNLOAD** command to default to the **Xmodem** protocol:

```
/FX_METHOD XMODEM
/SAVE
```

Note: To enter the underscore character with the CoCo, press and hold the **SHIFT** key and then tap the up arrow key.

You can also find out what your currently selected download protocol is by typing **/FX_METHOD** and pressing **ENTER**. Once you have selected a preferred file transfer method, the way to override it temporarily is to type **DOWN MENU** to get the download menu. Or, you can enter **/FX_METHOD NONE** followed by **/SAVE** to clear out your preference.

Another addition to the database software on Delphi is the **SHOW** command. This command, available from the **ACTION** prompt in all database topic areas, redisplay the file entries for the current group (the one you just read). You can redisplay just one file entry by typing **SHOW**, following it with the number of the entry in question and pressing **ENTER**. For example, to see the specifics about the fourth file in the current group, simply enter **SHOW 4**. If you want to see all the files for the group, enter **SHOW** by itself or **SHOW ***.

We feel each of these alterations will make life a little easier for Delphi and CoCo SIG users. One of the more confusing aspects of telecommunications to any new user is downloading. By making the databases a little easier to understand, as well as work with, users will be able to spend their online time more productively. □

use of the **DOS** command after an operation with a drive other than **Drive 0**.

In the Games topic area, **Fred McDonald** (**FREDMCD**) uploaded his excellent **Monopoly** game, and **Stephen Macri** (**DRACMAN**) sent us his fine **Tiahna** program, an experiment with artificial intelligence programming.

I'd like to add a note of clarification about a previous database report. The game **CRESCUE**, which is online in the games topic of the database, was originally written by **Greg Clark** (**GNOME**) and released to the public domain. It was uploaded to us by **James McDaniel** (**NEWKID**) during July. **CRESCUE** is an excellent game, featuring several well-drawn **Hi-Res** screens and very interesting action. Thanks, Greg and James, for sending us an outstanding game!

In the Product Reviews and Announcement topic area, **Mike Banks** (**KZIN**) posted an announcement concerning the new Delphi manual which will be available in bookstores soon. This manual will be adopted by Delphi as the official handbook for its users.

In the Data Communications topic area, **Marc Genois** (**MARCGENOIS**) uploaded Version 2.5 of the popular **Ultimaterm** terminal program for the CoCo 3. Before starting an **Xmodem** download with **Ultimaterm**, make sure you have it configured for an eight-bit word length and no parity. You may want to sign onto Delphi using these settings to avoid having to change them back and forth between seven- and eight-bit settings for each download. This is due to the fact that **Ultimaterm** doesn't adjust its terminal settings automatically for an **Xmodem** transfer, so the user has to handle the changeover manually.

See all of you online on Delphi!

— Don Hutchison

Rainbow CoCo SIG Database Manager

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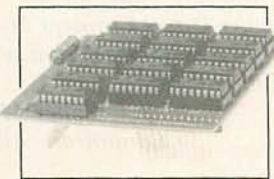
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Automatic PCLEAR

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra


 Is there any way to have my programs automatically do a PCLEAR0 with Disk BASIC?

Mary Willingham
Omaha, NE

R Place the following routine at the beginning of your program. This causes the program to relocate itself to &H0E01.

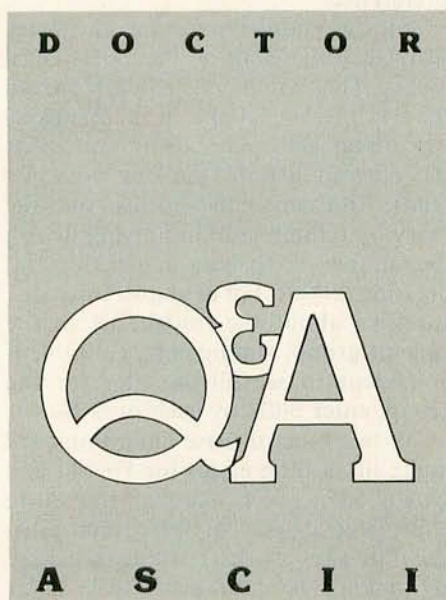
```
10 GOTO 5000
20 DATA BD,B3,ED,1F,02,
  7E,96,A7
30 RESTORE:FOR X=0 TO 7:
  READE$:NEXT
40 Place your program here
5000 CLEAR200:FOR I=0 TO 7:READ
  E$
5010 POKE&HE01+I,VAL("&H"+
  E$):NEXT
5020 DEFUSR0=&HE01:X=USR0
  (&HE09)
5030 GOTO 30
```

Label Jam

 I have a DMP-100 printer that I use with my CoCo 2. When I use mailing labels in the machine, I have to advance the platen by hand. It seems

Richard Esposito is a senior project engineer with Northrop Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.




that the paper is too thick for the machine to advance automatically. I have adjusted the print head, but this does not help. Are there any other adjustments I can make to the machine that will advance the paper automatically?

Bob Kemether
Bricktown, NJ

R There are thinner labels available that will feed properly. Check with a local business forms supplier or one of the many mail order firms.

Getting Online


 How do you link up Radio Shack's Deluxe RS-232 Program Pak with a BBS? Specifically, what should my

terminal settings be (I know the baud rate should be set to 300). Should my Modemphone be set to answer or originate? How do I "ask" a question or request to copy a program? Do I have to buy a terminal program or can I get an acceptable program from the BBS without any great programming skill?

Luis Modesto
Miami Beach, FL

R Set the phone to originate. Get a terminal program with Xmodem protocol, which will allow you to upload and download programs virtually error-free. The settings for most BBSs, including Delphi, would be 300 baud, 7 bits word length, even parity, 1 stop bit.

In Search of a Canadian Pak

 To be able to use the terminal program within DeskMate 3, I need an RS-232 Pak. In Canada, I'm told that this hardware was discontinued two years ago. Is there some kind of fix I could use short of sending to the states for the equivalent of the elusive RS-232 Pak? Radio Shack software support personnel didn't seem to be aware the RS-232 Pak was gone from the shelves and could not give any advice other than to buy the Direct Connect Modem ROM Pak. I have no need for a second modem! Can you help?

Walter Medak
Edmonton, Alberta

R Although it is officially S.O.W.G. (Tandy slang for "Sold Out When Gone"), many are still in warehouses and on store shelves around the United

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CBASIC III is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocations and so on, because CBASIC III will handle it for you automatically. For Advanced users, CBASIC III will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC III features well over 150 Compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. It supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Enhanced Color Basic, including Graphics H/GET, H/PUT, H/PLAY and H/DRAW, all with 99.9% syntax compatibility. CBASIC III also supports the built in Serial I/O port with separate programmable printer & serial I/O baud rates. You can send and receive data with ease to use PRINT, INPUT, INKEY, GETCHAR and PUTCHAR commands.

CBASIC makes full use of the powerful and flexible GIMI chip in the Color Computer 3. It will fully utilize the 128K of RAM available and install 2 Ultra Fast Ramdisks if 512K is available, for program Creation, Editing and Compilation. You can easily access all 512K of memory in a Compiled program thru several extended memory commands that can access it in 32K or 8K blocks and single or double bytes.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing Basic programs. It has block move and copy, program renumbering, automatic line number generation, screen editing, printer control and much more.

The documentation provided with CBASIC III is an 8 1/2 by 11 Spiral Bound book which contains approximately 120 pages of real information. We went to great lengths to provide a manual that is not only easy to use and understand, but complete and comprehensive enough for even the most sophisticated user.

CBASIC III is the most expensive Color Basic Compiler on the market, and well worth the investment. You can buy a less expensive compiler for your CoCo-3, and then find out how difficult it is to use, or how limited its features are. Then you'll wish you had bought CBASIC III in the first place. Dollar for dollar, CBASIC III gives you more than any other compiler available. If you can find a better CoCo-3 Basic Compiler then buy it!!!

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 - * Create and Edit files larger than memory.
- The Assembler portion of EDT/ASM III features include:
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 - * Allows assembly from the Editor Buffer, Disk or both.

Requires 128K & Disk \$59.95

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TEXTPRO IV is the most advanced word processing system available for the COCO-3, designed for speed, flexibility and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, and never expect to use multiple fonts or proportional spacing, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formatting problems and letter writing, then TEXTPRO IV is what you're looking for. It works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 70 different formatting commands you can use without ever leaving the text you're working on. There are no time consuming, and often frustrating menu chases, you are in total control at all times. You can see what the formatted document will look like before a single word is ever printed on your printer. Including margins, headers, footers, page numbers, page breaks, column formatting, justification, and Bold, Italic, Underline, Double Width, Superscript and Subscript characters right on the screen.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts, take a good look at this AD? It was done with TEXTPRO IV on an OKIDATA LASERLINE-6 laser printer!!! All the character sets used on this AD are proportional spaced characters, all centering, justification, and text printing was performed automatically by TEXTPRO IV.

Requires 128K & Disk \$89.95

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The DISPLAY you wanted but didn't get on your CoCo-3

- * 54 Different Character Sizes available from 14 to 212 cpl.
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HI-RES III will improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example, you can't use PRINT @ or have different character sizes on the same screen, even when mixing text and graphics with the HPRINT command. HI-RES III can give you the kind of display you always dreamed about having on your CoCo-3, with a wide variety of display options that you can easily use with your Basic or ML programs.

HI-RES III is totally compatible with Enhanced Color Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. With the full control code keyboard, you can control many of HI-RES III extended functions with just a couple of simple keystrokes.

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States. Contact mail order suppliers advertised in THE RAINBOW. P.B.J. also offers a compatible RS-232 Pak.


Old Drives and OS-9

 I have a CoCo 1 with 64K, a DMP-200E and two disk drives and recently purchased a CoCo 3, color monitor, the new disk drive unit and DeskMate 3. When I used my old drives with the CoCo 3 disk controller and tried to load DeskMate 3, all commands would work except the DOS command. I do not get an SN Error, but nothing happens. Are the old disk drives compatible with the new disk drive units when hooked to the other disk controllers? If so, then why don't mine work?

Dennis Restorff
Ft. Lewis, WA

R The old drives are compatible, but the old 12-volt controllers, even with 12 volts supplied by a Multi-Pak, cannot handle the 2 MHz clock speed of OS-9 Level II under which DeskMate 3 runs. You need a newer 5-volt controller.


Tapefix Fix

 I was looking through back issues of 80 Micro when I came across a program called Tapefix that appeared in your July 1986 column. It was described as being written for Disk Color BASIC 1.0. What, if any, changes need to be made for TapeFix to run on Disk Color BASIC 1.1?

Bill White
Live Oak, FL

R Tapefix is fully compatible with Disk BASIC 1.1. At the time the article was written, Disk BASIC 1.0 was the only version available and I was playing it safe so that when 1.1 came out, I would not get a flurry of mail if it was not compatible.

CoCo Goes Hollywood


 I read in Newsweek (August 10, 1987 issue) that several software companies have written software for personal computers that would enable a user to put special effects, color titles and other goodies on videotape either in real time or during edit sessions. These programs allow the home user to make "home movies" of the kids that have extra pizzazz. Have you heard of

anybody selling or planning to sell this type of program for the CoCo?

Bob King
New Bern, NC

R Simply hook your CoCo to your VCR via the antenna terminals, or if you have a CoCo 3, via the composite video jacks. Then CoCo Max, Color Max, Deskmate 3, etc., can be used to design fancy title screens for your home movies.

Data Line Dilemma

 Can you tell me why the following program won't work with any number except 123? Any other number in Line 120 gives a y\$.


```
10 CLS
20 READ A
30 X$=" IT IS A MATCH
40 Y$=" IT IS NOT A MATCH
50 Z$=" ANOTHER NUMBER?"
60 INPUT"TYPE A NUMBER;"N
70 IF N<>A THEN PRINT Y$
80 IF N=A THEN PRINT X$
90 PRINT:PRINTZ$:PRINT
100 RESTORE
110 GOTO20
120 DATA 123,132,213,231,
    312,321
```

Joseph A. Champagne
Ft. Lauderdale, FL

R The RESTORE statement in Line 100 makes the first number in the list of DATA statements available to the next READ, which occurs at Line 20. Perhaps this is what you really wanted:

```
10 CLS
30 X$=" IT IS A MATCH
40 Y$=" IT IS NOT A MATCH
50 Z$=" ANOTHER NUMBER?"
60 INPUT"TYPE A NUMBER;"N
62 FOR I=1 TO 6
63 READ A
80 IF N=A THEN PRINT X$: GOTO 90
85 NEXT I
87 PRINT Y$
90 PRINT:PRINTZ$:PRINT
100 RESTORE
110 GOTO60
120 DATA 123,132,213,231,
    312,321
```

Pirate Protection


 I have a CoCo 3 and am creating a BASIC program that I don't want people to be able to break into and

put their own names on. What I have done is disable the BREAK key and reset button, so that part is taken care of after the program is running. But I can't stop someone from just loading and then listing it. I was wondering if there is a way to create an autostart (disk) for my program. If there isn't, could you please tell me if there is some software that will do this?

Erik Yoder
Evanston, IL

R Microcom Software, P.O. Box 214, Fairport, NY 14450, (716) 223-1477 markets Disk Anti-Pirate, \$59.95, which would seem to meet your needs.


Typewriters as Printers

 I have a Brother Pro-7800 Correct-0-Ball typewriter, and I heard from a friend that you can hook a Brother typewriter to a Color Computer. Can I do this with my typewriter? How would I go about doing it?

Tim Sternburg
Thousand Oaks, CA

R If the typewriter has an RS-232 serial or a Centronics parallel interface, it can be done quite easily. If it has a serial interface, you need a custom cable. If it has a Centronics parallel interface, you need a serial-to-parallel interface.


Random Request

 How can I get a listing for the RANDOM routine? I started learning ML and need a complete listing to create my program. I am editing the program on EDTASM+ (disk or ROM).

Jean Gravelle
St. Rose De Lima, Canada

R Disassemble the code starting at \$BF1F, which is the entry point to the RND() routine; or better yet, get copies of the "CoCo Unravelled" series, which is sold by Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414.

TEC Drives Zap Directories

 I now have a CoCo 3 and two FD-500 drives. I also use the disk utility DU-3 (February '87) to load my programs from disk. After loading a program with DU-3, I list it and find out

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I have half of one program and half of a second program. I can't do a DEL to separate the second program. Even typing the line number and ENTER will not delete any lines. I must load the two half-programs into VIP Writer and then edit the mess. This never happened to me with my CoCo 2.

Edward Russell
Key West, FL

R Since you have the early, full-height TEC drives, which were notorious for going out of alignment and zapping directories and granule allocation tables, my guess is they are the problem. I suggest that you get rid of the TEC drives and replace them with

new half-height, double-sided ones. I also suggest that you replace your 12-volt controller, because the newer 5 volt-only ones will handle the 2 MHz speed of OS-9 Level II where the older 12-volt ones will not.

Disk Errors With DeskMate 3

R I recently upgraded from a CoCo 2 to a CoCo 3 because I needed more memory, but I was dismayed to find out that I did not have any more memory to access via BASIC. Everybody says I have to use OS-9 to access all of the memory. I tried DeskMate 3, but there was no disk space to store even a small file. So then I bought drives 2 and 3.

When I try to use drives 2 and 3 for data storage, I get disk errors. Can you help?

J. O.

Deland, FL

R DeskMate 3 comes configured for two drives. Using OS-9 Level II, you need to create a new Deskmate disk using CONFIG. When selecting system options, be sure to select TERM_VDG, since DeskMate uses that mode. You also need to select D2.dd and D3.dd to access drives 2 and 3.

All-RAM and EPROM Defined

R In many issues of THE RAINBOW I have seen uses for the CoCo's "all-RAM mode" and have seen the term "EPROM" used many times. Unfortunately, I haven't seen a definition of either and am compelled to ask what is probably a dopey question . . . What do the terms mean?

Tom McLarnan
San Francisco, CA

R When the CoCo is first turned on, the memory is configured so that the lower 32K of the 64K address space is occupied by RAM and the upper 32K with ROM. The 6809 microprocessor looks at addresses \$FFFE to \$FFFF to find where in this memory to start executing code. The code in the CoCo 3 that is executed eventually switches the CoCo into a mode where the ROMs are switched out of the 64K address space, and this is called the "all-RAM" mode. A ROM is a memory chip pre-programmed at the factory and retains its programming even when the power is off. An EPROM is similar to a ROM, but it can be programmed at home with a special hardware device called an EPROM programmer. To the computer, ROMs and EPROMs are essentially equivalent.



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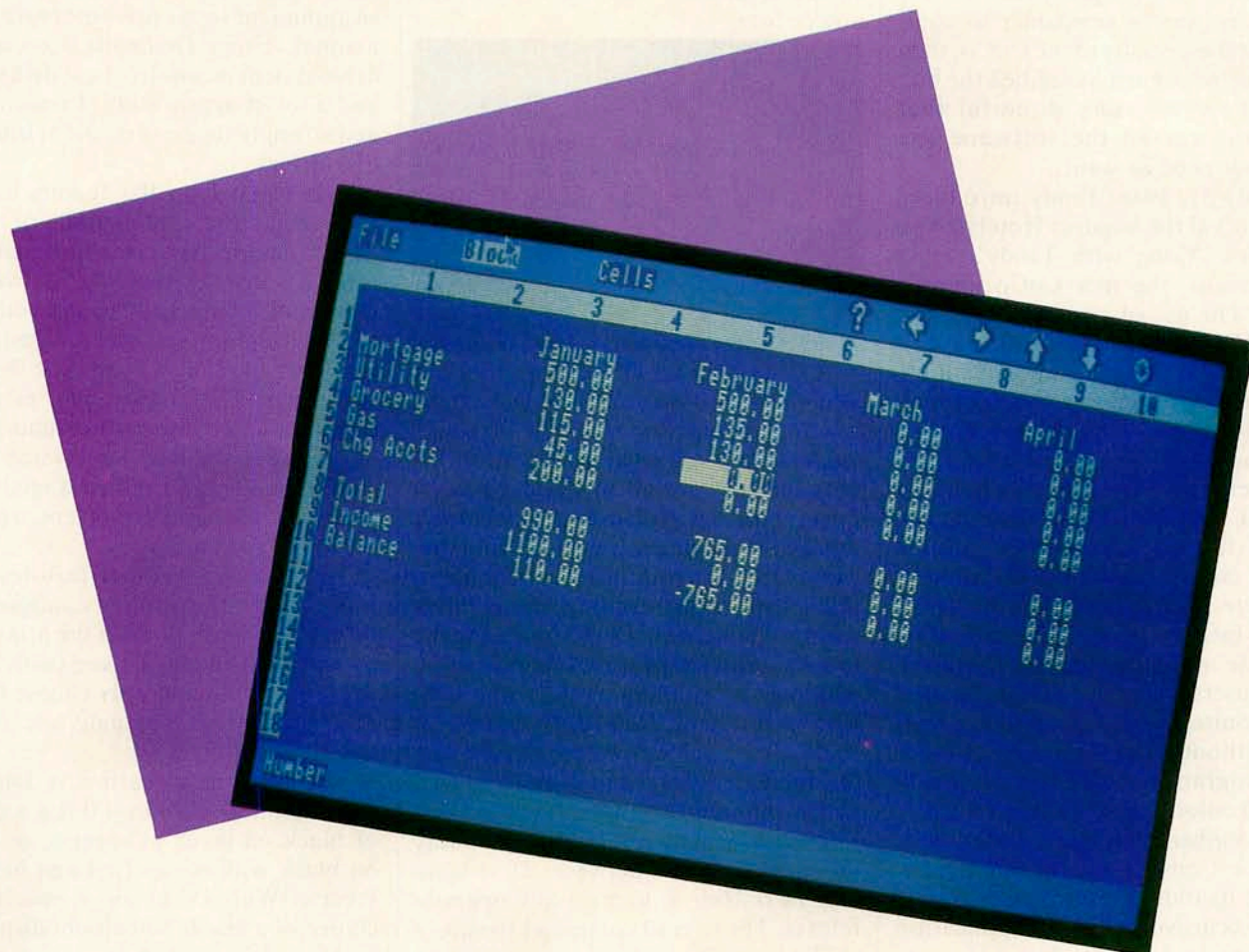
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For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.



Software

CoCo 3

DeskMate 3 — Some Important Extras for CoCo 3

In the fall of 1985, Tandy introduced *DeskMate*, its new software package for the CoCo. The program was based in the powerful Unix-like operating system for the Color Computer, OS-9. It had windows, online help, mouse control, colors, and was a thorough, integrated package with all the features anyone could want. *DeskMate* for the CoCo was designed to rely heavily on pop-up screens, menus, mouse control and its integrated features.

This sounded terrific, and for those of us who eagerly tore open the package, we were not disappointed. But we soon discovered that we needed a modem and had to have a multipack interface and

an RS-232 Pak to use Telecom. We were in a 40-column upper- and lowercase screen environment. One disk drive was not enough. Any non-Tandy printer needed some fiddling with to get graphics printed, and we couldn't send anything faster than 1200 baud to that printer, due to OS-9's limitations.

The manual was masterful. It had beautiful color screen examples scattered liberally throughout, lots of appendices, and an index. It even had a thorough tutorial to help with all these wonderful new programs. Many of us noted with quickening pulse the many references to an ALT key and a CTRL key. We found out that Telecom had only

Xon/Xoff file transfer protocol. But mostly, we were all happy and made good use of the software.

I already mentioned a few of the hardware and software limitations, which are critical when dealing with integrated software packages. By and large, no one can cram all the features of a dedicated word processing package into a module of an integrated software system. Remember, the main objective for *DeskMate* was integration, or having all programs and functions available from one central disk, without having to constantly swap programs and disks.

Inherent in all integrated packages is the compromise of features versus complexity. Users quickly discovered with the text editor that it was very, very straightforward. For instance, there was no quick or easy way to set double-spacing. Something as basic as that was either very difficult or couldn't be done. You could possibly figure out a way, by issuing printer escape codes before

booting *DeskMate*, but the average user wouldn't know how.

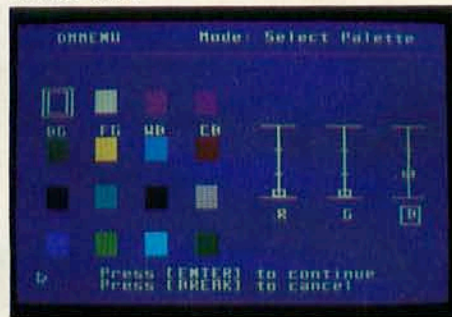
Chances are good that if you were a hard-core *Dynacalc*, *Telewriter 64* or *Profile* user, this program was not for you. If you were a newcomer to computing, and especially to the CoCo, then *DeskMate* might just have filled the bill. It was, however, very doubtful that *DeskMate* was all the software you would ever need or want.

On July 31, 1986, Tandy introduced the CoCo 3 at the Waldorf Hotel in New York City. Along with Tandy's other introductions, the new CoCo made a real hit. The use of a proprietary chip, the GIME, made it possible for the new CoCo to utilize more banked memory. It had a graphics display system with built-in high resolution text drivers and an analog RGB port, along with many other exciting features. It even had ALT and CTRL keys. Moreover, it would run most of the software written for the CoCo 1 and 2, and that meant that *DeskMate* 1.0 would run on the CoCo 3. It also meant that, because *DeskMate* makes use of high resolution artifacted colors, users with the CM-8 Analog RGB monitor would be unable to get color without running a special color patch program to bring out the *DeskMate* 1.0 colors on an RGB monitor.

In December of 1986, *DeskMate* 3 for the Color Computer 3 became available. Like its older version, *DeskMate* 3 is an all-inclusive integrated application with six main features. These features and subfunctions are very similar to those of the original *DeskMate*, but include some important extras and enhancements that take advantage of the greater memory and graphics capabilities of the CoCo 3. Perhaps the most important feature is 128K memory expandable to 512K. It allows the CoCo 3 to run OS-9 Level II, which can function only on machines with a minimum of 128K RAM. OS-9 Level II is important for several reasons. First, it takes advantage of more than 64K RAM, so there is much more user-available memory storage. Secondly, it has excellent file handling capabilities. And, it has windowing and greater graphics facility, making *DeskMate* 3 more easy to use in some ways, and giving it features that cannot be implemented on standard *DeskMate* 1.0.

A very good feature of *DeskMate* 3 is that it runs by simply typing DOS into the computer. OS-9 is transparent to the user; therefore, you do not have to worry about trying to master it. There are two exceptions: You must type a

pathname at certain places in *DeskMate*, and you must swap disks at certain other places. This is still handled straightforwardly in the manual and should create no confusion, even for the novice user.



A note here to OS-9 users: Should you want to use either the package as a whole or separate modules of *DeskMate*, it can be started from within OS-9 as the files are all in standard OS-9 Level II format. Because seven windows are available under Level II, and because OS-9 is a multiuser environment, this creates some exciting and creative ways to implement *DeskMate* 3 for the more sophisticated user. Imagine seven windows all running at the same time with a different *DeskMate* feature in each, all available from the CLEAR key. Or, imagine two terminals hooked to a CoCo running *DeskMate*.

There are many similarities and many identical features between *DeskMate* and *DeskMate* 3, as with any upgrade release. The overall command structure is identical. The only exceptions are in implementing new features, which follows consistently with other command formats; the @ key is replaced by the ALT key on the CoCo 3, and the CLEAR key is replaced by the CTRL key on the CoCo 3.

There are several important changes in the *DeskMate* 3 main menu. The first is noticeable right away, a little trash can icon in the lower-right corner labeled "trash." This trash can is used to delete files when using the mouse or joystick cursor control option. You drag the file to the trash can and "throw it out."

The second change is that *DeskMate* 3 is a two-disk set, with Ledger contained on a separate disk. The program boots by looking at the programs in Program Folder 3. If you are using one disk drive, you have to swap between the two disks for saving files and changing applications. In addition, you are required to set the pathlist, which is a way to tell *DeskMate* what "path" to follow to find programs and save data. This is more important to multiple disk

drive users, as *DeskMate* 3 defaults to only one disk drive. The remaining programs are in Program Folder 4, which is on the other disk. Instructions for setting the path list to find files or swapping for single drive users are in the manual. Using *DeskMate* 3 on a one-drive system means frequent disk swaps and a lot of aggravation. I recommend and strongly suggest you use at least two disk drives.

The Menu Icon Bar feature lets the user access the subfunctions of *DeskMate*: files, printer, calculator, date and time set, display type, cursor control, help, and a "hot key" to get you back to the program you were in last, with whatever file that was open at the time still open. That means you can stop editing a letter in the 40-column mode by exiting to the Icon Bar, switch to 80-column mode, and return directly into your edit file, as OS-9 keeps track of open files for you.

There are several new features here. First, under the printer configuration function you can now set the printer for between 300 and 9600 baud (with *DeskMate* 1.0 you could only choose 600 or 1200 baud). This is actually a feature of OS-9 Level II.

The next new feature is Display. Display for *DeskMate* 1.0 was a choice of black on green or inverse, or white on black with colors (red and blue) or inverse. With *DeskMate* 3, you have a choice of a 40- or 80-column display in Ledger, Text and Telecom. This enhancement gives a WYSIWYG (What You See Is What You Get) display in these three programs. This is an excellent enhancement that takes advantage of the CoCo 3 display capabilities. The CM-8 Analog RGB monitor provides crisp and clear 80-column display. With a medium resolution color composite monitor, the 80-column display is difficult to use, and you may have to use only the 40-column display. With a monochrome monitor, the display can be used in an 80-column format. Results vary substantially with the quality and type of monitor you use.

The best display by far is the RGB. With *DeskMate* 3 the user has 16 color choice combinations at any one time. The color is set using a special program with a palette and color scales to select colors for the background, foreground, window borders and command bar. The program is difficult to get used to at first, but after a little familiarity it is easy to set the resolution between 40- and 80-column and to set the colors any way you want.

Neither Calendar nor Filer have been altered significantly from *DeskMate* 1.0. The greatest difference is that Index Cards from *DeskMate* 1.0 has been named Filer in *DeskMate* 3. All files are compatible with the older *DeskMate*, however, and Filer automatically converts Index Card files to the new Filer format.

Text and Ledger have been upgraded to include a choice of either 40- or 80-column screens in each of the programs. You can switch between the screen formats at any time. This enhancement makes a big difference in both Text and Ledger; with Ledger you can see a lot more rows and columns of data and how changes impact the spreadsheet twice again as much as was possible with *DeskMate* 1.0. With Text you have a similar advantage, you get a full 80 columns of text, giving a more realistic idea of what the formatted page will look like when completed. For users with televisions or composite monitors, the 40-column choice is still there. Files are also directly compatible with *DeskMate* 1.0.

Telecom has been improved in several key areas. The first is a choice of either a full 80-column or a 40-column display. This really makes a big difference in communicating with machines that are used to sending 80-column screens. It also means that you don't have to reconfigure for 40 columns every time you call a new computer. It also provides more of a viewing window with the view option to see what information has been received.

A second major enhancement that makes life much easier with Telecom is the Xmodem option. Now users have the choice of using either Xon/Xoff file transfer protocol or Xmodem file transfer. Xmodem makes file transfers much easier, and is more accurate, saving time and money.

The third enhancement is an increase of about 10K in the storage buffer. This is now 23K from 13K in the original *DeskMate* 1.0. Also, the terminal screen has been enhanced and simplified for transmitting and receiving files under a separate option, which makes them easier to utilize while online. Yet another change is that User Keys 8 and 9 have been left undefined, so you can install your own macros instead of being forced to use them for User I.D. and Password.

The Serial Port option must be set at /T2 if you are using the Tandy Multi-Pak interface and an RS-232 program pack; otherwise, you will be unable to

access terminal mode.

Paint is another area of *DeskMate* 3 that has been greatly enhanced. In combination with the CoCo 3's display capabilities and some program changes, Paint now gives you a 16 color 160-by-200 pixel resolution screen to work with. *DeskMate* 1.0 had four colors and a resolution of only 128-by-192 in four-color mode. With the new Paint, there is only one high resolution mode, and no longer an option for "colors" under the edit menu. There are also less initial patterns. The edit pattern screen, however, has been substantially enhanced to incorporate all 16 colors available to create and edit your own patterns in an 8-by-8 pixel matrix. This screen is operated very similarly to the Display option screen on the Icon Bar.

In addition, several new tools have been added to Paint to assist in the drawing process. These are solid rectangle, solid circle, and rays, which draw lines extending in any direction from a common hub or matrix. I thought the manual could have been a little bit better in introducing the user to Paint in the "Getting Started" section.

This, then, is the new *DeskMate* 3 for the Color Computer 3. We have taken a look at the new features, some advantages and some drawbacks to the new software. As an integrated package, this is a full-featured program. As a group of stand-alone products, these programs are limited. As a writer, for example, I need a more full-featured text editing program than Text. For my work at home, however, this product provides the basic functions that I need with the added convenience of all being interconnected by one program.

As many readers might agree, there are other factors besides productivity that influence the view of a product. For a child to learn on, this is an excellent package. For an adult new to computers, this is an excellent product to get the sense of how programs work. For a household, this product is more than adequate to generate notes, draw pictures, keep an inventory or phone list, call the computer at the office, etc. It can best be described as simple, yet sophisticated.

Still another feature is what has been called "user-friendliness." Is the program friendly to you? With *DeskMate* 3, the answer is yes, very friendly and fun to use. It comes with an Intro Pak to Compuserve and a quick reference card to all the commands and features, which make it very easy for the user to get up and running.

The documentation that accompanies *DeskMate* 3 is complete and easy to read, and organized better and more thoughtfully than the original *DeskMate* 1.0. Of great value are the many screens and examples, and the "Getting Started" section gets the user up and running in short order.

Anyone in need of an integrated set of programs for the Color Computer 3 should consider *DeskMate* 3. This is a quality software package, and very useful with all its self-contained features and functions.

(Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; \$99.95: Available in Radio Shack stores nationwide.)

— Jeffrey Parker

Software

CoCo 1, 2 & 3

CoCo Disk Zapper — A Handy Utility

CoCo Disk Zapper is a handy utility that you can use if you ever have the unhappy experience of crashing a disk, or want to modify a disk file. The program is menu-driven and works on all models of the Color Computer.

The menu options available include:

- A) Alphabetize Directory
- D) Drive = 0
- L) Look at track/sector
- Q) Quit
- S) Search Disk for string
- T) Translate = ON
- V) Verify Disk
- Z) Zap current track/sector

Most of these options are obvious, but a few bear further explanation.

The Search Disk string option is handy because it finds every track and sector on the disk where a specific string of characters is located, and it displays that information on the screen or to your printer.

The Translate option is provided so that you can view the disk contents in ASCII form. Unfortunately, you can't toggle on and off without first going back to the menu and reselecting the track and sector. If ASCII is on, you can type directly onto the sector. If ASCII is off, you must type on the sector in hexadecimal.

Verify Disk lists all bad tracks and sectors right on the screen, along with the appropriate error message. The arrow keys are used to move the cursor through the tracks and sectors.

CoCo Disk Zapper is a copy-protected program and is sold as is with no warranty, although a program is provided to allow you to make a non-executable backup. I believe Microcom should offer some kind of replacement policy if backup opportunities are to be prevented.

(Microcom Software, P.O. Box 214, Fairport, NY 14450, 716-223-1477; \$24.95 plus \$3 S/H)

— David Gerald

Software

CoCo 3

Pyramix — Keeps You Hopping

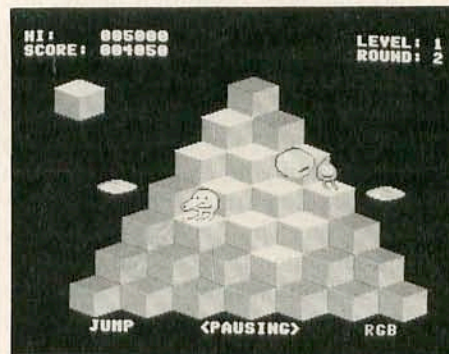
Pyramix is similar to the old favorite "Q-bert" arcade game. It's a 100 percent machine language program requiring a minimum of 128K RAM. The colors are brilliant, the graphics are razor sharp, and the action is fast and furious. Excellent sound effects are used throughout the program to enhance the animation.

The object of *Pyramix* is simple, and you catch on very quickly as to how to play. All you have to do is hop a short, fat little guy with a long snout, Kubix, on top of the blocks that make up a pyramid on the screen. When Kubix hops on a block it changes color, and the idea is to get all the blocks the same color. When all the blocks match the master cube shown in the upper-left corner of the screen, you advance to the next level.

While this all sounds pretty easy — believe me, it's not. There are many falling boulders to thwart your progress, and contact with a deadly snake costs you a Kubix. As you try to avoid these obstacles and change block colors, you will also notice a little guy the authors call a "punk" with sunglasses. His sole purpose in life is to undo all your hard-earned color changes.

There are six levels of difficulty in

Pyramix. I was only good enough to get to the second level, but then again, as I get older my coordination seems to diminish. My 10-year-old daughter, however, got to Level 4 with little difficulty. The game can be played with a joystick or with the arrow keys. I really recommend a joystick if you want to accumulate a large score.



I was impressed with the opening title screen and game board that drops down from the top of the screen and "bounces" several times before play begins. The bouncing is very life-like and really shows off CoCo 3's advanced graphics capabilities. The game can be played with either a composite or RGB monitor. I tried it on both but, as you would expect, the colors are more vivid and brilliant on an RGB monitor. A nice feature is the use of a built-in Help screen. A brief encounter with this screen is all you need to be able to play the game, although excellent documentation is provided.

For those who score well, pressing S displays the game high scorers. If you don't press any keys, the game automatically goes into the Demo mode. Watching the demo gives you a few good hints on avoiding many of the obstacles that you will encounter.

A number of objects and characters make up the *Pyramix* game including the likes of Smack, Smuck, Time Stopper, Red Ball, Purple Ball/Kaderf, Elevator Discs, Death Square and Diamond. All of these critters play a big part in your ability to maneuver your Kubix over the pyramid. If you're not careful about which direction Kubix is facing, you will watch helplessly as he falls into oblivion. Scoring is based on your ability to catch Smack or Smuck, the Green Time Stopper Ball, or changing the colors of the blocks as you hop. You also get extra points for completing the various levels of difficulty.

Pyramix is copy-protected and written only for disk systems. Information

is provided on how to make a backup copy that can be used to restore the original in case of trouble. The game is provided on both sides of the disk and can be used as a floppy, so you start off with two copies of the program.

I loved *Pyramix*. I believe this program shows off the graphics potential of the CoCo 3 at its best. ColorVenture should be congratulated for an excellent product, and I anxiously await other CoCo 3 developments from them.

(Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228, 502-241-6474; \$24.95)

— Jerry Semones

Software

CoCo 1, 2 & 3

Inventory Manager — Keeps Stock Records Up-To-Date

The one day businesses dread most is the day inventory must be taken. The tedious time spent in counting each item and noting the quantity can be enough to drive anyone crazy. *Inventory Manager* does not take inventory for you, but it makes the experience less painful.

Inventory Manager is an inventory database that revolves around manufacturer part numbers, a copy of the same program that uses four-character/digit stock numbers you assign, and a converter that changes a file created by one into the other. It also has the ability to create purchase orders.

When starting the program, the user is greeted with a simple graphics screen. Press any key and the program starts. Each time the program is run you are asked for the following information: Have you entered your business address? How many drives are you using? What is your printer baud rate? While I realize that your hardware may change (you buy a better printer or add a second drive), an option on the main menu to configure the program would be far less repetitious.

When you reach the main menu, you can actually begin work. Here you may either create, print or edit the files containing your stock information by selecting the appropriate option. When

creating files, it should be noted that each of your suppliers should have his own file, as there is an auto-order routine in effect.

Regardless of the version you use (part numbers or your stock ID), the beginning of each item file contains the supplier name and address. A word of caution: When entering the name and address, do not press the ENTER key until all the information has been entered, i.e., the name and address must be entered as a single line of information. At this point, you begin to define the items by entering the part number or the stock number, the quantity on hand, the auto-order number (when your stock reaches or falls below this number it reminds you to order more), how many you want in stock after the order (the program subtracts the actual from this number to determine how many to order), your cost and the retail cost.

When all the items are defined (you may have a maximum of 200 items in any one file, and up to 22 files per disk), you may edit the file. With this option, you can change any field in a given file, add to or delete from the file, and save the results. Using another menu option,

you can add or subtract items sold or received. When your in-stock number falls below the auto-order number, the Purchase Order option prints an invoice to send to your supplier.

The program is really very simple to use. There are a couple of problems, though. The first is with the manual. While I had the luxury of time to figure out how everything works, you might not. The manual is poorly written and has no table of contents to direct the user to specific information. At best, it is difficult reading. The fairly straightforward aspects of the package are explained, but the detailed features are skimmed over.

The second problem seems to be in the support area. The program (in versions for either RS-DOS or JDOS) is copy-protected. There is extensive use of the high-speed poke. If your system does not handle the poke well, the manual instructs you to return the program with a note, and it will be modified for you. I wrote to Forrest Enterprises and after three weeks had not received a response. This does not bode well for customer support.

Overall, the program performs as advertised. But with the apparent lack

of support, an ordinarily fine program is left to suffer.

(Forrest Enterprises, 1521 Lancelot, Borger, TX 79007, 806-274-3083; \$25: First product review for this company appearing in THE RAINBOW.)


— D.A. Ferreira

Software

CoCo 1, 2 & 3

Winnie the Pooh and the Hundred Acre Wood — And Tigger, Too!

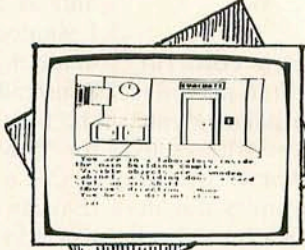
Winnie the Pooh and the Hundred Acre Wood is an Adventure game designed for children ages 7 and up. It requires a Tandy Color Computer, one disk drive and at least 64K RAM. Although the game runs under the OS-9 operating system, OS-9 is not required to load or run it. You can use the DOS command in Disk BASIC Version 1.1, or type in a special loader program provided in the manual if you do not have



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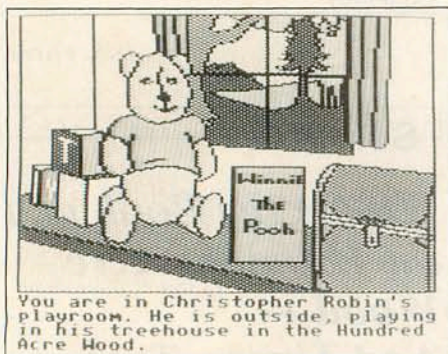
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Version 1.1. I have Disk BASIC 1.0 and I also have OS-9 Level I Version 1.1. I tried the special loader program, the OS-9 boot program included with the OS-9 system, and running from within the OS-9 shell itself.



The special BASIC loader program worked perfectly. It is a short program and very easy to type in, but it must be saved on a disk other than the *Pooh* disk since the *Pooh* disk is in a special OS-9 compatible format. The OS-9 boot program also worked without a hitch.

Pooh comes on a single disk written on both sides in "flippy" fashion. This means you simply turn the disk over to gain access to side two on a single-sided drive. The game boots from side one and then requests that you insert side two to complete the loading process. The instructions call for using a backup copy of the disk. Even though *Pooh* runs under OS-9, you can use the standard *BACKUP* command to create your backup copy. Unless you have access to a flippy disk, the backup requires two disks.

The manual begins with a short story about Pooh and his walk through the Hundred Acre Wood. Pooh finds that many of his friends have lost some object. It is up to him to find these objects and return them to their proper owners.

There are a total of 10 objects scattered throughout the woods. Pooh begins his search from Christopher Robin's playroom and proceeds into the woods looking for the missing objects. Once an object is found, Pooh must return it to its proper owner or location in the woods. For instance, a lost picnic basket belongs under an empty picnic table.

Excellent graphics are used throughout the game showing scenes in the woods. Stories are given describing each scene along with a list of things Pooh can do. There are usually several choices that describe something Pooh may do, or he may select North, South, East or West. Using these choices Pooh

can search the woods for all the missing objects and their owners.

When an object is found, a "take" choice is provided. When already carrying an object, a "drop" choice is displayed. Pooh can carry only one object at a time and when he drops an object, he is informed whether or not he has found the correct owner.

Every now and then Tigger bounces in and causes Pooh to lose what he is carrying. A wind may also blow in and mix everything up in the woods again, confusing poor Pooh. If Pooh is not careful, he may get lost in the mist and cannot see anything. When this happens all he can do is keep walking until he is out of the mist, but no telling where he will be by then.

If Pooh needs help finding out where the object belongs, he may take it to wise Mr. Owl and receive a clue as to the proper owner. However, Pooh must still locate the owner's whereabouts himself.

All in all, *Winnie the Pooh in the Hundred Acre Wood* is a very exciting game for young and old alike. The graphics are excellent and children learn how to create and read maps and charts to assist them in locating the objects and their owners. Walt Disney Software and Sierra On-Line have a real winner in *Winnie*.

(Sierra On-Line, Coarsegold, CA 93614; \$34.95. Available in Radio Shack stores nationwide.)

— Larry Birkenfeld

Software

CoCo 1, 2 & 3

CoCo Checkbook — Keeps You in Balance

CoCo Checkbook is a colorful, menu-driven program that provides you with an easy way to balance your checkbook and track expenditures by category. While the author is wise to point out that the program is not intended to replace the user's own check register, it aids in reconciling your checkbook with your monthly bank statement.

The program is written in BASIC for a minimum of 16K and works on the CoCo 1, 2 and 3. It is supplied on disk, and is not copy-protected. Documenta-

tion consists of a detailed 49-page notebook that includes seven sample sessions used to acquaint the user with loading, operation and file manipulation.

The maximum number of transactions allowable is 1,500 using a single disk drive or 2,200 with two drives. The user can establish 64 different account names, making it easy to keep track of expenses by categories such as food, clothing, gasoline, house payments, entertainment, etc. The program accepts check numbers from 0 to 9999. The maximum value for a single transaction is \$9,999.99, or an accumulated total of \$99,999.99.

CoCo Checkbook is designed to allow input of automatic bank deposits, teller machine transactions, and cash transactions. Budgeting is accomplished by setting aside funds to meet periodic payments. These funds, while not appearing in your checkbook register balance, are included when your statement balance is computed. Since each budgeted account is maintained separately, the balance in each category can be established at any time.

A printer is optional; however, I recommend one to get the most flexibility out of the program. Provisions are made to delete or change categories and entry transactions. You can search the disk files for transactions made on a specified date, check number, payee, account name, or amount paid. This is a powerful feature if you write a lot of checks or spend a lot of money.

I liked *CoCo Checkbook*. User supplied disk file extensions make it easy to spot data files for a specific period, such as CAR.87. Besides the various submenus which walk the user through each transaction, lots of prompts are used to alert the user as to what kind of input the computer is expecting.

I did notice that when setting up some sample files, the computer wanted the date as MM/DD/YY. However, when I wanted to see all the transactions I made in August, I was forced to enter 8 instead of the expected 08 in spite of the fact that the prompt clearly asked for "MM."

CoCo Checkbook is a good program that can make your life a little easier. It's a perfect companion for the CoCo in the home environment and is adequate for many small business applications.

(Bob's Software, P.O. Box 391, Cleveland, OH 44701, 216-871-8858; \$25)

— Jerry Semones

Caladuril Flame of Light — A Different Kind of Adventure

Caladuril Flame of Light is different from any Adventure game I have played in the past. Instead of using the standard North, South, or N, S, or go N, go E, etc., you use the arrow keys to move. While this may not be unique by itself, this and the graphics that go along with it make it different.

The screen is split into sections. The top-left quarter, called the Play Field, is used for the graphics and lets you see where your character, Jame, is and the adjoining terrain. The bottom half is like the standard Adventure game area. This is where you see the text from the Adventure and where you type in the commands to manipulate objects.

The top-right quarter of the screen is split into two parts. The top part, titled Visible Objects, is used when you move up close to an object. The object name

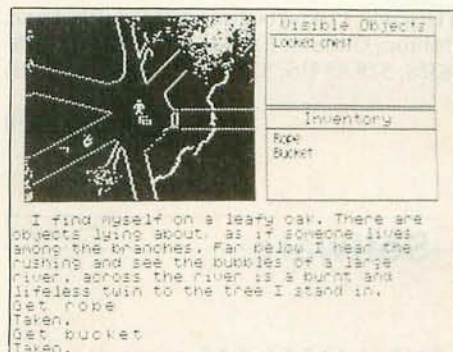
is listed. If your monitor does not make it clear what the object is, this makes identification much easier.

The bottom is titled Inventory and is just that. This is very nice since, at a glance, you always know what you are currently carrying. If your screen is so bad that even the writing in these two areas is illegible, you can type VIEW or INVENT to have that area printed on the lower half of the screen.

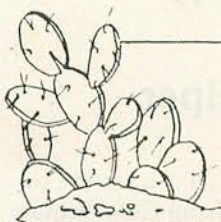
As in all Adventure games, a map is helpful, and it is always advisable to save your game often. *Caladuril* allows you the option of saving only one game. But all good Adventurers can overcome. To play *Caladuril*, you use the Boot disk to start, and insert a Player disk to play. While the boot disk is copy-protected, it is recommended to make a backup of the player disk. So, make a couple of backups of the player disk and save the game in multiple stages.

You must have a player disk in the drive as you play the game since it occasionally goes to the disk to load pictures and data about the new areas, but any player disk will do this. You can put in a new player disk anytime you want to save the game at the new location.

Caladuril has a Restart command that protects you. Typing RESTART after you load a game puts it back to the nearest non-critical point. At this point the game can be won. You may use Restart at any time during the game, so you could use it to try different solutions to the same problem.



The documentation states that the program requires a Color Computer with 64K and a disk drive and that it also runs on a CoCo 3. It did run on my CoCo 3 just like my CoCo 1, almost. While the play and look of the game was the same on both machines, *Caladuril* was compatible with ADOS on my CoCo 1, but it was not compatible with ADOS 3. I had to throw my trusty little



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switch to go to Radio Shack DOS. The **Fast** command puts the CoCo 3 in the double-speed mode and **Slow** returns it. These commands are ignored by the CoCo 1 and 2.

I really enjoyed *Caladuril Flame of Light*, but I have to admit, I did not solve it.

(Diecom Products Inc., 6715 Fifth Lane, Milton, Ontario, Canada L9T 2X8, 416-878-8358; \$28.95 US; \$38.95 CDN plus \$2 S/H)

— Dale Shell

Software

CoCo 3

CBASIC III — Power for Programmers

CBASIC III is a complete editor/compiler programming system for the Tandy Color Computer 3. By implementing all standard BASIC statements, including the new Hi-Res commands, complemented with an excellent text editor, and topping it all with an efficient compiler, Cer-Comp has given CoCo 3 BASIC programmers a powerful tool.

Just what is a compiler, anyway? A compiler converts BASIC code into machine language, creating programs which are accessed by **LOADM** and **EXEC**. The main advantage to this format is extra speed of execution. The Color BASIC which comes built into the CoCo 3 is in the form of an interpreter. As each BASIC line of code is encountered, it is "interpreted," then converted to binary code which implements the instructions on a line-by-line basis. A compiler, on the other hand, pre-converts the BASIC code into pure machine language, thus allowing the resulting binary code to skip the repeated need to interpret each line. This results in much faster instruction execution.

CBASIC III has gone this one better by adding many additional BASIC commands to the programmer's repertoire, and has added a more powerful text editor to assist in writing and debugging BASIC code.

The program comes on a single copy-protected disk, along with a well-written manual. Users can back up the original disk, but the copy is not exec-

utable. It is kept aside to be available for restoration of the original, should it ever become unusable. The manual is neatly done, featuring a spiral binder, a handy feature for keeping your place when working.

When *CBASIC III* is loaded, the editor is automatically active. It has not only the standard BASIC editing commands, but some added features as well. Some of these are quite powerful. For example, **SEARCH**, as suggested by the name, searches through the program for a given string. **RPLACE** replaces a given string with another. Key repeat is implemented and the repeat speed controlled with **RDELAY**. Characters per line can be altered with **SW** (Set Width). Many more editing commands, such as **LEDIT**, **AEDIT**, **PRINTER**, **SIZE**, **BRATE**, **LF**, **CCOLOR**, etc., have also been added. Programming commands have not been overlooked and quite a few interesting ones are added. Some, like **SWAP\$** (a handy one) and **GEN** (allows ML instructions to be directly inserted) are so powerful you will wonder why they weren't there in the first place. Others include **HIRE**, **UNLINK**, **CBLINK**, **SIGN**, **ON INTERRUPT**, **IRQ**, **LPOKE**, **DLPOKE**, **RAM**, **CHAIN**, etc. Access is afforded to a full 512K of memory. There is no need to go into detail as to particular functions in this review. Suffice it to say that they are of value, and are fully documented in the accompanying manual. Once edited, programs are saved in an ASCII format, with the extension **<CBA** automatically appended.

After the code is saved, compiling can safely take place. Starting the compile process is as simple as typing *CBASIC program name*. As the program compiles each line, errors are highlighted for ease of further editing. Output of the line-by-line error checking can be directed to a printer for maximum convenience in further editing. The resulting code is automatically saved with the **<BIN** extension. Assuming all errors have been corrected, this code can be loaded with the **LOADM** command, just as any other **<BIN** program.

There are some differences between Color BASIC and *CBASIC III*. For one, the dimensioning of strings (**DIM**) is handled differently by *CBASIC III*. Variable initialization to particular values is also needed. Don't worry about that, the author shows you a shortcut. Most command syntax remains identical to the Color BASIC version.

Like most of us with a new program, I couldn't wait to get started with this review. I quickly saved a couple of my

own BASIC programs in ASCII format and tried compiling them. Much to my amazement, I had them compiled and working just fine in only a few minutes. Don't get me wrong — this does not happen every time. To fully utilize a program with this power, you have to read and maybe reread the manual. Most of the problems I did encounter turned out to be just a matter of my not following instructions.

In summation, I would say that Cer-Comp has created a real winner with *CBASIC III*. As a CoCo user since the days of 4K and a tape drive, I am always anxious to try out the latest in CoCo hardware and software. Over the years, few products have impressed me as much as this one. Simply put, *CBASIC III* is an all-around excellent package.

(Cer-Comp, 5566 Ricochet Avenue, Las Vegas, NV 89110, 702-452-0632; \$149)

— Leonard Hyre

Software

CoCo 3

CoCo Max II Patch — CoCo 3 Helper

CoCo Max II Patch is a set of powerful new programs from ColorVenture that allow owners of *CoCo Max II* to use this popular program on their CoCo 3. This is done with the use of Tandy's Hi-Res Joystick Interface (Cat. No. 26-3028) that sells for \$9.95 at Radio Shack stores nationwide.

Not only can you use *CoCo Max II* on your old Color Computer with the Colorware Hi-Res Joystick Interface Pack, you can use it on your CoCo 3 with the simple addition of the Tandy Hi-Res Interface. With this approach, you don't even need the Multi-Pak Interface or a Y-cable, and you can access 256-by-192 pixels using a joystick, mouse or X-pad. One word of caution: You have to use either an RGB monitor capable of color composite video, a color composite monitor or a color TV, since the Tandy CM-8 does not display artifact colors. If you use these patches for *CoCo Max II* with your CoCo 3 and CM-8 monitor, you will get pictures in black and white.

The disk contains patches for *CoCo*

Max II, *Max Edit* and a program called *HJOYSTK*. The patches are very simple to install. A new file, *NEWMAX*, results and is used to run the patched *CoCo Max II* program on your CoCo 3. A direct patch is provided for *Max Edit* if you have it and is run just like before with *RUN "MAXEDIT"*. In both cases, you are instructed to make a backup copy of your original disks before you attempt either of the patches. The *CoCo Max II* patch program disk is not copy-protected, so backup copies for your protection are recommended.

The third program on the disk, *HJOYSTK*, is a Hi-Res Joystick Interface driver that provides a way to access all 640-by-640 pixels available on the CoCo 3 from your own BASIC or machine language programs. This is a handy utility program that can be used to support the Tandy Hi-Res Joystick Interface used with not only your joystick, but with a mouse or X-pad as well. A demo program is supplied that demonstrates the use of *HJOYSTK*.

I liked *CoCo Max II Patch*. It was simple to install the two patches and *CoCo Max II* worked fine on my CoCo 3. I was able to load, view and edit many

of my old *CoCo Max II* pictures with no problem.

(Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414, 718-835-1344; \$24.95 plus \$3 S/H)

— Michael Beckman

Software

CoCo 1, 2 & 3

QuikPro+II — Writes Databases for You

I have often heard the old cliché, "Seeing is believing," and sometimes you really do have to see to believe. This is a case in point.

Several months ago, I received in the mail an advertisement from ICR FutureSoft offering to sell me a \$149 program called *QuikPro+II* for the small sum of \$29.50. With such a price

drop a few "flags of doubt" arose in my mind. But what really raised those flags to a level of rejection was the advertisement's claim that this was a piece of software that would write programs for you, and you didn't even have to know how to program the computer. I figured that this was just too good to be true and threw the advertisement away.

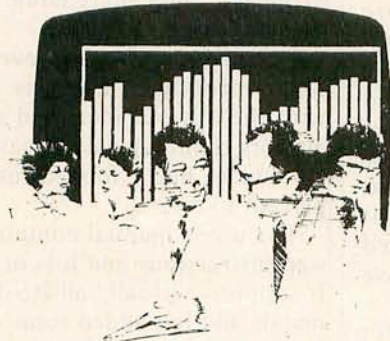
A few months later, lo and behold, here comes a review package from RAINBOW with that very piece of software in it. So, OK, we now have a way to really test the advertising claims.

The packaging of *QuikPro+II* was really impressive. It came in a nice vinyl case and contained an 80-page instruction manual. I really didn't see how they could even put out this sort of package for such a small sum. So the "catch" must be that there's something wrong with the software — right? Wrong!

I scanned the manual for enough information to get the program up and running. The purpose of *QuikPro+II* is to write programs that will set up and allow input and maintenance of databases. Following the instructions in the manual and the onscreen prompts, I set up a screen of data input fields for a

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R.A.D. Products Presents TEXTFORM

Finally, a versatile text formatter is available for the Color Computer. TEXTFORM is compatible with all models with at least 64K, even the Color Computer III. This machine language program will format ASCII text files into two column pages quickly and easily. Text may be left unmodified, or simply insert special formatter commands for added control. TEXTFORM is a versatile enhancement to any word processing system whether you are a casual or professional user.

Software supports:
- Output to printer or disk
- Most popular printers
- Adjustable format parameters
- Columnar data
- Multiple page titles
- Optional page numbering
- Large files (up to a full disk)

TEXTFORM comes with complete documentation as well as sample format examples. Onscreen parameter display takes the guesswork out of format settings. Customized parameters may be saved to disk and reloaded for future use, thus eliminating mistakes and configuration time. Special printer codes and baud rate settings are software selectable. TEXTFORM is programmed in a high resolution environment which incorporates pull-down menus for ease of use. The software also supports auxiliary peripheral input from joysticks, mouse, touchpad, and high resolution input pack for added program control.

This is not another word processor. There are many fine word processors on the market for the Color Computer. TEXTFORM is a user definable two column text formatter. If you are looking for a program which will allow your Color Computer to create professional looking documents without hours of tedious work, then TEXTFORM is the answer.

Ideal for:
- School newspapers
- Club newsletters
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- Advertisements
- Program listings
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System requirements:
- Color Computer (64K minimum)
- Disk drive
- Printer

TEXTFORM.....\$34.95

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program to maintain employee records of a mythical company. Even with my constant referral to the manual, it only took a few minutes. Then I pressed a key and a message came on the screen to tell me that my program was being written for me. I had not entered a single line of programming. After a few more minutes, a message came on the screen to tell me that my program was reading and asked if I wanted a hard copy printout.

QuikPro+II had done exactly what it said it would — write a five-page, tightly-packed BASIC program that I could run like any other BASIC program to create a database for maintaining employee records. It was unbelievable! But the software doesn't stop there. There was more, a lot more.

QuikPro+II also asked if I wanted a user's manual to go along with my new program. Not only did it write the program, it wrote the documents to go along with it.

Further study of the *QuikPro+II* manual indicated that the program will sort the records for you, if desired, and that you could even make some of the data input fields "calculation" fields. That is, fields that can be mathematically manipulated. I am absolutely amazed at what this program can do, and I had thrown the original advertisement away.

Needless to say, I was extremely curious as to how this piece of software could do what it does, so I immediately dove into it. The disk contains 11 files. All are ASCII BASIC or text files. The version I was working with was designed for the CoCo 1 or 2, one disk drive, and a 32-by-16 screen. However, it does run on the CoCo 3; it just won't take advantage of the CoCo 3's expanded potential, i.e., 80-by-24 column screen. What the programmers of *Quik-*

Pro+II have done is to very cleverly take advantage of the file merge functions of ASCII files. (This, of course, does cost a little in time for the slower ASCII program loads, but once your program has been written, it can be saved back to disk in the faster loading compressed or binary BASIC format).

By using this merge function, most of the final program can already be written, and it is only a matter of taking what is needed to complete the user's created program. This goes for the newly-written program's user manual as well.

One of the promises *QuikPro+II* makes, and it carries it out very well, is that your new program will be highly commented with remark statements. They, likewise, follow this same practice with their own programs. Now ordinarily, a program written in BASIC, particularly in ASCII BASIC, with a lot of remark statements, is extremely slow, a big disadvantage. In the case of *QuikPro+II*, while it is slow to load, it does not seem to suffer any from a lack of speed in operation. And for the CoCo 3 user, the disadvantages of this highly commented ASCII BASIC program turn out to be a real big advantage.

Because of the consistency in program design and the use of fairly standard BASIC, *QuikPro+II* can easily be modified to take advantage of the 80-by-24 screen size of the CoCo 3. There are even places in the program already set up for "error traps," (a function not supported on the CoCo 1 or 2). Most of the modifications only have to do with increasing the size of set variables having to do with screen size and the like.

In fact, the only disadvantage of the *QuikPro+II* system is the hardware limitation of the CoCo 1 and 2 32-by-16 screen. Part of this screen must be used by the program for prompts and line guides, so this limits the number and size of the data fields that can be designed and utilized. Other than that one small disadvantage, I must say that this is one of the best programmed pieces of BASIC software that I have seen.

After working with *QuikPro+II* for this review, I am now sorry that I did not respond to the original advertisement mailer. Seeing what the program can do made a believer out of me.

(ICR FutureSoft, P.O.Box 1446-FC, Orange Park, FL 32073, 800-872-8787; \$29.50 plus \$4.50 S/H)

— Kerry Armstrong

Software

CoCo 3

MLBASIC — Create Machine Language Programs

MLBASIC is an enhanced BASIC compiler written for the 128K CoCo 3 with Radio Shack DOS. It is a full compiler that features most of the commands available with Extended Disk BASIC, but added commands in *MLBASIC* make it easy to interface programs with assembly language and other BASIC programs. Best of all, *MLBASIC* allows CoCo 3 users who are not familiar with machine language programs to create them from their BASIC listings with ease. Default options are provided at the menu level and make first-time users feel at ease.

MLBASIC is provided on disk only and comes with a comprehensive 172-page, spiral-bound user's manual. The disk is not copy-protected, so you can make a backup copy for safekeeping. The program is very easy to use and, as already mentioned, menu-driven. Since it's for the CoCo 3, the menu is done in 80-column format with red and white letters on a black background. The user simply steps through the menu prompts and selects such items as whether or not the program to be compiled is in memory or on disk, filenames to be used, etc. Since the compiler actually translates your BASIC or source program into a new object file, it can be relocated and executed where it is, as opposed to the file being interpreted one line at a time as in BASIC. *MLBASIC* also optimizes the program, thus increasing operating speed.

I tried *MLBASIC* on several of my BASIC programs and was impressed with the obvious increased speed. The authors claim typical increases of 10 to 20 percent but it looked more like 50 percent to me.

The user's manual contains step-by-step instructions and lots of examples. It supports virtually all RS-DOS commands and has added some of its own. Numerical error codes are used (and explained in the user's manual) to flag programming faults.

MLBASIC is a fine program for any serious programmer.

(WasatchWare, 7350 Nutree Drive, Salt Lake City, UT 84121, 801-943-6263; \$59.95 plus \$4 S/H)

— David Gerald

Happy Holidays!





The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

◆ **ADDRESS**, a program that automatically addresses envelopes using any two addresses in the proper formatted position. Fifteen files hold 18 records per file for a total of 270 addresses. For the CoCo 3. *RJF Software, RR #2, White Lake, Ontario, Canada K0A 3L0, (613) 623-7824; \$14.95 plus \$3 S/H.*

BTU Analysis 3.0, an upgrade version that includes disk I/O and automatic lowercase switching within the program. It also fixes bugs found in Version 1.0.0 and 2.0.0. For the CoCo 1, 2 and 3. *A to Z Unlimited, 901 Ferndale Boulevard, High Point, NC 27260, (919) 882-6255; \$39.95 plus \$3 S/H.*

CAIS Version 2.0, a checking account information system that is menu-driven. This disk-based application is designed to make the task of managing checking accounts easier and faster. For the CoCo 1, 2 and 3. *After Five Software, P.O. Box 21095, Columbia, SC, (803) 788-5995; \$34.95 plus \$2.50 S/H.*

CoCo 3 OS-9 Ramdisk Package, a package that includes the device driver and descriptor necessary to implement a RAM disk under OS-9 Level I or II on a CoCo 3. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; \$29.95 plus \$3 S/H.*

Color Max III Font Editor, a program that allows you to design and edit your own character sets. For the CoCo 3. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; \$29.95; Font Disk #1, \$19.95; both \$39.95 plus \$3 S/H.*

◆ **Home-Pac**, a home financial package that lets you fill 51 to 80 characters per line with current credit card expenses and totals added to categories. For the CoCo 1, 2 and 3. *Computer Villa, 1328 48th St., Des Moines, IA 50311, (515) 279-2576; \$39.95 plus \$3 S/H.*

◆ **How to Build Your Own Video Arcade Game**, an instruction booklet on how to rebuild a video arcade game using your CoCo 1 or 2. Also included is a disk that contains four games. *R.A.M. Electronics, 814 Josephine Street, Monmouth, OR 97361, (503) 838-4144; \$29.95.*

OS-9 Level Two Development System, a system that includes an interactive debugger; a screen-oriented text editor; a relocating macro assembler; three utilities: Make — to help maintain current version software, Touch — to update files, and VDD — a Virtual Disk Driver/RAM Disk Driver to create high-speed storage in your system's RAM; twelve additional OS-9 commands to expand your system's capabilities. For the CoCo 3. *Tandy*

Corporation, 1700 One Tandy Center, Fort Worth, TX 76012; \$99.95. Available in Radio Shack stores nationwide.

◆ **Superbrush**, a tool for home or office that contains one Superbrush with a coarse grade FybRglass refill installed, and two extra refills made of stainless steel wire and fine grade FybRglass. May be used for removing rust spots, cleaning electrical contacts, and roughing surfaces before using epoxy or glue, etc. *The Eraser Company, Inc., Oliva Drive, Syracuse, NY 13221, (315) 454-3237; \$6.98.*

◆ **SYNTRAX 2.00**, a 64K sequencer that becomes the control center of your Musical Instrument Digital Interface studio, with the ability to control multiple music synthesizers, rhythm machines or other MIDI devices. Included is a demo disk with four pre-programmed scores. For the CoCo 2 and 3. *Intercomp Sound, 129 Loyalist Avenue, Rochester, NY 14624, (716) 247-8056; \$95 plus \$3 S/H.*

◆ **First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Judi Hutchinson

RAINBOW

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW. The "Rainbow Scoreboard" is now a bimonthly feature.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS.

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● Shutout

ADVANCED STAR*TRENCH (THE RAINBOW, 7/86)

3,975 ★David Schaller, Clarkston, WA
3,960 Maurice MacGarvey, Dawson Creek, British Columbia
3,960 Robbi Smith, Helena, HI
3,800 Shaw Muniz, Los Angeles, CA
2,600 John Fredericks, Kalkaska, MI
2,450 Blain Jamieson, Kingston, Ontario

BEE ZAPPER (THE RAINBOW, 9/87)

9,650 ★Benoit Landry, Drummondville, Quebec

BIOSPHERE (Radio Shack)

25,345 ★Robert St. Pierre, Coventry, RI
21,372 Randall Edwards, Dunlap, KS
14,186 David Spalding, Galena Park, TX
10,056 Carlos Gameros, El Paso, TX
3,822 Kevin Hilton, Gurdon, AR

BOUNCING BOULDERS (Diecom)

9,318 ★Skip Taday, East Lyme, CT
8,859 Darrell Gilpin, Norwalk, CA
7,448 Philip Manwarren, Harrington, ME
3,994 Louis Bouchard, Gatineau, Quebec
1,561 Lise Nantel, L'Acadie, Quebec

BOXING (THE RAINBOW, 8/86)

560 ★Jason Ebbeling, Berkshire, MA

BUBBLE WARS (THE RAINBOW, 2/86)

52,100 ★Daniel Cecil, Bardstown, KY
42,800 Blain Jamieson, Kingston, Ontario
41,400 Becky Rumpel, Arcadia, WI
26,350 Jason Ebbeling, Berkshire, MA

BUZZARD BAIT (Tom Mix)

22,931,850 ★Skip Taday, East Lyme, CT
763,550 Geran Stalker, Rivardale, GA

CANYON CLIMBER (Radio Shack)

178,200 ★Darren King, Yorkton, Saskatchewan
169,000 Gregory Speer, Emporia, KS
159,200 Upton Thomas, Arnold, MD
150,200 Brian Lewis, Baltimore, MD
141,400 Michael Petry, Kansas, AL
135,600 Eric Rose, Grand Coulee, WA
128,000 Tony Bacon, Mt. Vernon, IN
125,600 Tim Lang, Downieville, CA
125,000 Tony Fortino, Tacoma, WA

CASTLE (THE RAINBOW, 8/86)

326,352 ★Richard Donnell, Penns Grove, NJ
228,622 John Broussard Jr., Alexandria, LA
202,659 Brendan Powell, La Grande, OR
116,606 Darryn Bearis, New Carlisle, Quebec
93,672 Maurice MacGarvey, Dawson Creek, British Columbia

COLOR BASEBALL (Radio Shack)

999-0 ★Erik Munson, Tucson, AZ
999-0 ★Danny Wimett, Rome, NY
998-0 ★Eugene Paoli, Wilmington, DE
982-0 ★Geran Stalker, Rivardale, GA
866-1 Ghislain Chillis, Trois-Rivieres, Quebec

814-0 ★John Licata, Richton Park, IL
814-1 Frank D'Amato, Brooklyn, NY

COLOR CAR (Novasoft)

209,381 ★Roger Rosebrock, Leipsic, OH
10,097 Justin Mai, Rapid City, SD

CRYSTLE CASTLES (ThunderVision)

554,979 ★Patrick Martel, Laval, Quebec
60,107 Alphonse Brown, Houston, TX

DALLAS QUEST (Radio Shack)

86 ★Roy Grant, Toledo, OH
86 ★Melanie Moor, Florence, AL
86 ★Paul Summers, Orange Park, FL
87 Douglas Bell, Duncan, OK
87 David and Shirley Johnson, Leicester, NC
89 Chris Piche, White Rock, British Columbia

89 Milan Parekh, Fullerton, CA
89 Andrew Urquhart, Metairie, LA
89 Steve Zemaitis, Howell, MI
91 John Semonin, Akron, OH

DEF MOV (THE RAINBOW, 1/87)

30,253 ★Benoit Landry, Drummondville, Quebec

DEMOLITION DERBY (Radio Shack)

210,700 ★Duke Davis, Sandwich, IL
124,000 Judy Haviland, Caldwell, ID
16,100 Christopher Heston, Louisville, KY

DEMON ATTACK (Imagic)

40,435 ★Upton Thomas, Arnold, MD
28,780 Daniel Streidt, Cairo, Egypt
4,960 Laundre Clemon, Sacramento, CA

DEVIL ASSAULT (Tom Mix)

1,866,100 ★Stephane Martel, Laval, Quebec
623,550 Dale Krueger, Maple Ridge, British Columbia
75,000 Blake Cadmus, Reading, PA
59,200 Stephane Martel, Laval, Quebec

DOWNLAND (Radio Shack)

99,980 ★Danny Wimett, Rome, NY
98,985 Karl Gulliford, Summerville, SC
97,740 Stephane Deshaies, Beloeil, Quebec
89,490 Neil Edge, Williston, FL
77,254 Tom Audas, Fremont, CA
73,346 Jean-Francois Morin, Loretteville, Quebec
70,142 Chris Goodman, Baltimore, MD
68,142 Cooper Valentin, Vavenby, British Columbia
67,721 Keith Yampanis, Jaffrey, NH
62,442 Eddie Lawrence, Pasadena, Newfoundland
55,300 Patricio Gonzalez, Buenos Aires, Argentina
49,500 Danny Perkins, Clifton Forge, VA
43,502 Mike Ellis, Charlotte, MI
41,896 Antonio Hidalgo, San Jose, Costa Rica

40,360 Jesse Binns, Phoenix, AZ
34,424 Andrea Mayfield, Melbourne, FL
25,147 Timothy O'Neal, Commerce, TX
21,527 Scott Godfrey, Nashua, NH
19,835 Christopher Heston, Louisville, KY
18,251 Sam DiCerce, Willowich, OH
18,103 Sarah Van Oteghem, Taylor Ridge, IL
17,120 Kay McCluskey, Remsen, NY

DRAGON BLADE (Prickly-Pear)

69 ★Jason Damron, Folsom, CA

DRAGON FIRE (Radio Shack)

146,325 ★Stephane Martel, Laval, Quebec
5,561 Chris Lorenz, Kiester, MN

ENCHANTER (Infocom)

400/212 ★Charly Rushing, Santa Rosa, CA
400/621 Brad Wilson, Lithia Springs, GA

400/431 Truman Bryerton, Jr., B.Ville, NY
224/358 Joseph Delaney, Augusta, GA
185/186 David Tarleton, Williamsburg, VA

ESCAPE 2012 (Computerware)

202 ★Roy Grant, Toledo, OH

EVICTOR (THE RAINBOW, 7/86)

12,915 ★Spencer Metcalf, Longview, TX
10,560 Patricio Gonzalez, Buenos Aires, Argentina

7,125 Jason Ebbeling, Berkshire, MA

FALCON'S LAIR (THE RAINBOW, 8/85)

45,425 ★Talib Khan, Bronx, NY

FIRE COPTER (Adventure International)

64,710 ★Phillip Gregory, Moultrie, GA

FIRESTORM (THE RAINBOW, 1/86)

22,505 ★Chad Presley, Luseland, Saskatchewan
8,910 Stephane Martel, Laval, Quebec
5,680 Kathy Rumpel, Arcadia, WI
3,760 Rick Beevers, Bloomfield, MN
3,505 Blake Cadmus, Reading, PA

GALACTIC ATTACK (Radio Shack)

26,370 ★Jeff Remick, Warren, MI
9,930 Daniel Streidt, Cairo, Egypt

GALAGON (Spectral Associates)

328,820 ★Bernard Burke, Lee's Summit, MO
255,080 Jason Clough, Houston, TX
249,960 Matthew Fumich, Munford, TN
169,410 Danny Dunne, Pittsfield, NH
149,520 Vernon Johnson III, Parkville, MD
116,280 Scott Jamison, Billerica, MA
116,000 Micah Clough, Houston, TX

GALAX ATTACK (Spectral Associates)

236,350 ★Corey Leopold, Nada, TX

GALLOPING GAMBLERS (THE RAINBOW, 12/85)

3,427,660 ★Sean Lair, Ewing, MO

GANTELET (Diecom Products)

23,643,720 ★Geran Stalker, Rivardale, GA
20,921,490 Randall Edwards, Dunlap, KS
10,222,940 Clinton Morell, Sacramento, CA
10,020,500 Ken Hubbard, Madison, WI
7,493,340 Stirling Dell, Dundalk, Ontario
2,626,950 Jonathon Ross, Pocomoke City, MD
2,512,620 Jason Steele, Pensacola, FL
2,312,640 Rory Kostman, Hershey, NE
2,115,790 Jerry Honigman, Waggoner, IL
2,011,200 Jerry Colbert, Bakersfield, CA
1,108,750 Robert Fox, Dover, OH
1,094,280 Donnie Pearson, Arvada, CO
1,081,530 Michael Wallace, Bronx, NY
1,025,900 John Hotaling, Duaneburg, NY
1,016,050 Edward Swatek, Chicago, IL
933,740 Yvan Langlois, Laval, Quebec
932,660 Brian Hunter, South Berwick, ME
787,780 Brad Wilson, Lithia Springs, GA
685,840 Karen Jessen, Cleveland, OH
667,390 Robbie Smith, Helena, HI
456,220 Scott Jamison, Billerica, MA
410,868 Billy Helmick, Independence, KY
79,570 David Gordon, Pierre, SD

GHANA BWANA (Radio Shack)

523,080 ★Joseph Delaney, Augusta, GA
252,840 Edward Rocha, Cobleskill, NY

GIN CHAMPION (Radio Shack)

2,272 ★Michael Petry, Kansas, AL

SCOREBOARD

GRABBER (Tom Mix)		PINBALL (Radio Shack)		3,820		Eddie Lawrence, Pasadena, Newfoundland	
432,650	★Matthew Fumich, Munford, TN	213,300	★Patrick Martel, Laval, Quebec	142,400		Thomas Payton, Anderson, SC	
HALL OF THE KING (Prickly-Pear)		PITFALL II (Activision)		2,550		James Church, Pointe Claire, Quebec	
107	★Joshua Wanagel, Freeville, NY	199,000	★Sean Noonan, Green Bay, WI	2,000		Charles Marlow, Briarwood, NY	
HOME ROW BOMBER (THE RAINBOW, 1/87)		PITSTOP II (Epyx)		1,740		Mike Watson, Northville, NY	
6,384	★Timothy Hennon, Highland, IN	54	★Rusty Breitbach, Rickardsville, IA	1,160		Joel DeYoung, Manson, Manitoba	
3,372	Benoit Landry, Drummondville, Quebec	54	★Jeff Coburn, Easton, PA	STARLORD (THE RAINBOW, 8/86)		10,489,710	
2,420		54	★Walter Hearne, Pensacola, FL	★Frederick Lajoie, Nova Scotia, Canada		STELLAR LIFE-LINE (Radio Shack)	
JOKER POKER (THE RAINBOW, 3/87)		51	★Sean Noonan, Green Bay, WI	629,000		★Steven Smith, Matthews, NC	
2,793,285	★Blain Jamieson, Kingston, Ontario	49	Christian Grenier, Valleyfield, Quebec	114,620		Martinez Domingo, Miami, FL	
13,377	Jason Ebbeling, Berkshire, MA	9	Randy Venable, Coal City, WV	SUCCESS MANSION (THE RAINBOW, 1/87)		13/13	
THE JUNGLE (THE RAINBOW, 8/84)		POLARIS (Radio Shack)		★Dave Alessi, Iselin, NJ		SUPER ROOTER (THE RAINBOW, 5/86)	
432,223	★Michael Nystrom, West Bridgewater, MA	161,198	★Danny Remick, Warren, MI	15,180		★Richard Donnell, Penns Grove, NJ	
JUNIOR'S REVENGE (Computerware)		POLTERGEIST (Radio Shack)		11,090		Frederick Lajoie, Nova Scotia, Canada	
2,503,000	★Stephane Martel, Laval, Quebec	4,855	★Darcy Gifford, Portland, OR	3,910		Daniel Bradford, Birmingham, AL	
257,600	Keith Cohen, Rocky Mount, NC	4,080	Alphonse Brown, Houston, TX	TEMPLE OF ROM (Radio Shack)		303,600	
JUNKFOOD (THE RAINBOW, 11/84)		POOYAN (DataSoft)		★Tim Hennon, Highland, IN		TIME BANDIT (MichTron)	
18,650	★Daniel Streidt, Cairo, Egypt	99,500,300	★Danny Wimet, Rome, NY	89,650		★Sarah Rollin, San Bruno, CA	
KARATE (Diecom Products)		97,500,000	Rich Fiore, Clemson, SC	48,990		Andrew Rollin, San Bruno, CA	
11,600	★Jonathon Ross, Pocomoke City, MD	54,500,000	Carlos Gameros, El Paso, TX	TREASURE QUEST (THE RAINBOW, 11/86)		645,360	
6,300	David Darling, Longlac, Ontario	3,785,000	Ben Collins, Clemson, SC	★Stephane Martel, Laval, Quebec		TREKBOER (Mark Data)	
THE KING (Tom Mix)		1,987,000	Jon Sowle, Sanford, FL	132		★Matthew Fumich, Munford, TN	
3,824,280	★Andre Grenier, Quebec, Canada	POPCORN (Radio Shack)		123		Roy Grant, Toledo, OH	
22,400	Spencer Metcalf, Longview, TX	94,470	★Patrick Martel, Laval, Quebec	TUT'S TUMB (Mark Data)		118,720	
KORONIS RIFT (Epyx)		PYRAMID (Radio Shack)		72,000		★Reina Roy, Carleton, Quebec	
186,710	★Tony Harbin, Cullman, AL	220	★Jason Ebbeling, Berkshire, MA	60,020		Chad Presley, Luseland, Saskatchewan	
184,120	John Farrar, Lebanon, TN	PYRAMID 2000 (Radio Shack)		45,000		Don Siler, Muncie, IN	
84,830	Thomas Beruheimer, Yoru, PA	100	★Peter Antonacopoulos, Toa Baja, Puerto Rico	VARLOC (Radio Shack)		2,032	
84,070	David Spalding, Galena Park, TX	QUIX (Tom Mix)		2,032		★Tony Harbin, Cullman, AL	
33,900	Steven Moreno, Stockton, CA	8,407,772	★John Haldane, Tempe, AZ	2,008		★Edward Rocha, Cobleskill, NY	
13,210	David Ewing, Deatsville, AL	1,404,000	Curtis Goodson, Sao Paulo, Brazil	1,995		Philip Puffinburger, Winchester, VA	
LANCER (Spectral Associates)		1,003,104	Elisa Goodson, Sao Paulo, Brazil	1,988		Denise Rowan, Minneapolis, MN	
567,200	★Luke Birinyi, Pefferlaw, Ontario	205,335	John Hotaling, Duaneburg, NY	1,975		Randall Edwards, Dunlap, KS	
227,800	Andre Grenier, Valleyfield, Quebec	104,034	Christopher Conley, North Attleboro, MA	VICIOUS VIC (THE RAINBOW, 7/86)		18,813	
178,800	Christian Grenier, Valleyfield, Quebec	RADIO BALL (Radio Shack)		10,489		★Talib Khan, Bronx, NY	
99,700	David Kauffman, South Haven, MI	6,330,350	★Myriam Ferland, Trois-Rivieres, Quebec	6,294		Karl Gulliford, Summerville, SC	
LUNAR RESCUE (THE RAINBOW 8/87)		4,510,740	Les Dorn, Eau Claire, WI	4,643		Pat O'Neill, Nepean, Ontario	
113,579	★Jeff Remick, Warren, MI	1,945,110	Dominic Deguire, St. Basile, Quebec	3,285		Martha James, Swarthmore, PA	
LUNCHTIME (Novasoft)		1,768,940	Brian Buss, Whitehall, PA	THE VORTEX FACTOR (Mark Data)		100/276	
444,325	★Richard Donnell, Penns Grove, NJ	1,631,750	David Del Purgatorio, Antioch, CA	100/483		★Tommy Crouser, Dunbar, WV	
136,925	Alphonse Brown, Houston, TX	RAIDERS (THE RAINBOW, 11/86)		Rick & Brenda Stump, Laureldale, PA		210	
55,550	Richard Deane, Chicago, IL	2,100	★Dave Alessi, Iselin, NJ	Paul Maxwell, Vancouver, British Columbia		WARP FACTOR X (Prickly-Pear)	
42,025	Steve Place, Webster, NY	RESCUE ON FRACTALUS (Epyx)		5,829,559		★Doug Lute, Clymer, PA	
MEGA-BUG (Radio Shack)		99,967	★Gary Sebastian, Hazel Park, MI	WILDWEST (Tom Mix)		38	
5,172	★Jason Ebbeling, Berkshire, MA	48,445	Steven Moreno, Stockton, CA	★Neil Haupt, Elyria, OH		WRESTLE MANIAC (Diecom)	
MINIGOLF (THE RAINBOW, 5/86)		1,792,800	★Chad Presley, Luseland, Saskatchewan	956,971		★Marc Reiter, Cincinnati, OH	
29	★Jason Ebbeling, Berkshire, MA	ROGUE (Epyx)		546,315		Louis Bouchard, Gatineau, Quebec	
MISSION: F-16 ASSAULT (Diecom Products)		27,542	★Melanie Lapoint, Fitchburg, MA	45,483		Tony Bacon, Mt. Vernon, IN	
468,750	★Karen Jessen, Cleveland, OH	17,851	Yvan Langlois, Laval, Quebec	39,086		Billy Helmick, Independence, KY	
355,570	Stirling Dell, Dundalk, Ontario	8,812	Allen Houk, San Diego, CA	26,599		Jonathon Ross, Pocomoke City, MD	
318,160	Jeremy Pruski, Sandwich, IL	6,576	Kirk Marshall, Westport, MA	ZAKSUND (Elite Software)		39,950	
137,920	Mike Grant, Fresno, CA	5,679	David Spalding, Galena Park, TX	ZAXXON (DataSoft)		2,061,000	
127,550	Michael Heitz, Chicago, IL	5,369	John Moore, Ottawa, OH	1,950,000		Blake Cadmus, Reading, PA	
120,670	Vernon Johnson III, Parkville, MO	5,274	Roland Brumfield, LaJolla, CA	1,300,500		Dan Brown, Pittsford, NY	
58,530	Chris Wright, New Albany, IN	4,719	Mary Calcott, LaJolla, CA	1,100,600		Andrew Urquhart, Metairie, LA	
MOON HOPPER (Computerware)		SAILOR MAN (Tom Mix)		253,400		Bob Dewitt, Blue Island, IL	
103,840	★Alphonse Brown, Houston, TX	332,600	★Jeremy Carter, Spring Lake Park, MN	170,600		Matthew Yarrow, East Hampton, MA	
51,870	Martin Kertz, Forrest City, AR	SANDS OF EGYPT (Radio Shack)		163,700		Daniel Bradford, Birmingham, AL	
MUDPIES (MichTron)		82	★Edward Rocha, Cobleskill, NY	119,600		Daniel Streidt, Cairo, Egypt	
486,500	★Stephane Martel, Laval, Quebec	86	Roy Grant, Toledo, OH	118,100		Upton Thomas, Arnold, MD	
MUNCHKIN BLASTER (THE RAINBOW, 8/87)		87	Neil Haupt, Elyria, OH	111,400		Jeff Miller, Bronson, MI	
9,000	★Benoit Landry, Drummondville, Quebec	SAUCER DEFENSE (THE RAINBOW, 4/87)		87,200		Tim Lang, Downieville, CA	
7,240		30,900	★Jason Ebbeling, Berkshire, MA	83,700		David Darling, Longlac, Ontario	
NUKE AVENGER (T&D Software)		5,433	★Benoit Landry, Drummondville, Quebec	81,000		David Anderson, Midlothian, VA	
60,250	★Doug Lute, Clymer, PA	SHORT-TERM MEMORY TEST (THE RAINBOW, 12/85)		ZONX (THE RAINBOW, 10/85)		6,500	
OMNIVERSE (Computerware)		20	★Brian and Harold Matherne, Gretna, LA	★Daniel Streidt, Cairo, Egypt		ZUES (Aardvark)	
112	★Roy Grant, Toledo, OH	SLAY THE NERUIS (Radio Shack)		3,380		★Martin Kertz, Forrest City, AR	
ONE-ON-ONE (Radio Shack)		73,091	★Jeff Remick, Warren, MI				
1,276-0	★Jonathan Dorris, Indianapolis, IN	SPACE AMBUSH (Computerware)					
1,210-0	★Gregg Thompson, Chesterfield, VA	250,000	★Roger Spackman, Gaspé, Quebec				
1,204-0	★Chad Johnson, Benton, AR	SPEED RACER (MichTron)					
1,160-0	★Mark Lang, Downieville, CA	148,050	★Alan Martin, Cornwall, Ontario				
1,132-23	Dan Liffmann, Andover, MA	130,720	Patricio Gonzalez, Buenos Aires, Argentina				
1,122-4	Jason Ebbeling, Berkshire, MA	SPEEDSTER (THE RAINBOW 8/87)					
PAPER ROUTE (Diecom Products)		3,350	★Jamie Stoner, Mt. Union, PA				
1,120,350	★Neil Haupt, Elyria, OH	SPIDERCLIDE (Radio Shack)					
1,059,350	David Kauffman, South Haven, MI	6,170	★Talib Khan, Bronx, NY				
830,950	Christopher Darden, Woodson Terrace, MO						
720,560	Konnie Siewierski, Schaumburg, IL						
531,600	Larry Shelton, Marion, IL						
PEGASUS AND THE PHANTOM RIDERS (Radio Shack)							
303,100	★Mike Grant, Fresno, CA						
244,100	Martinez Domingo, Miami, FL						

— Jody Doyle

— Jody Doyle

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, which appears bimonthly, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

In response to questions from:

● Jaan Laansoo: In *Sands of Egypt*, the torch can be found by going to the snake, then going west twice, south once, east once and then digging.

● Brien Louque: In *Sands of Egypt*, you can get the water after oiling the scepter and getting and emptying the canteen. To do this, ride back to the oasis, fill and get the canteen. Then type DRINK.

● Anne Fiehler: I hope you tied the boat to the pole in *Sands of Egypt*! If you did, don't try to get the treasures. Go to the crack and get your supplies. Go to the archway, untie the rope and look up. Drift until you see a hole in the roof, then drop and climb the ladder. Then feed, mount, ride and dismount the camel.

David Rothgery
Sheffield Lake, OH

● David Gordon: On Level 8 in *Gantelet*, the transporters have "sensitive corners." You must first find them, then you may go one of two ways. Going up and to the right puts you into a chamber where the bones surround a pair of keys. Or you can go to the right, then up, but you'll have to avoid Death in the process. You will end up in front of three corridors: the left leads to a dead end; the right leads to a plate of food; and the center leads to a great hall. Keep going right and you'll find the exit, but beware of Death.

Make sure your character is exactly on the teleporter or it has no effect.

The exit to Level 14 is in the lower right-hand corner of Level 13. Once on Level 14, you can explore or just exit to Level 15. After Level 15, you start to repeat levels. The exit on Level 15 is in one of the corners but it's not easy to get to.

David Schulze
San Antonio, TX

● Jason Bell: You cannot carry the treasure in *Sands of Egypt*, so type GET LADDER, GO CRACK, GO ARCHWAY, UNTIE ROPE, UNTIE ROPE again (once for the pole and once for the boat). Ride

the current to the place where the hole is by pressing ENTER over and over. Then type DROP LADDER and CLIMB.

In *Pyramid 2000*, to get the statue you have to drop the scepter first. To open the sarcophagus you need the jewel encrusted key. Does the nest of golden eggs belong to the statue?

In the *Interbank Incident*, what do you put in the slot on the yacht?

Patrick Slagle
Thibodaux, LA

● Rusty Merritt: To open the painted door in *Bedlam*, you have to get Napoleon in the room with the painted door and ask him to open the door.

Edward Rocha
Cobleskill, NY

● Steve Moore: After you find the secret passage in *Raaku-Tu*, type GO IN PASSAGE, but make sure you have everything you want because you cannot return to the temple.

Also in *Raaku-Tu*, I know how to get out of the temple but what do I do after I am out? How do I get over the rug or do I even need to get over it?

Tony Bacon
Mt. Vernon, IN

● Scott Melton: In *Sands of Egypt*, to avoid dying, start by going north three times and then west twice.

Marshall Miller
Oneonta, NY

● Damon McGaughey: In *Hall of the King*, you have to type POUR ACID and when it says "where?" type STEEL BANDS. Then get the one key piece and go to the room with the gate. Bend the crowbar and the rest is up to you.

Spencer Metcalf
Longview, TX

Scoreboard:

In *Dungeons of Daggorath*, when you get a ring revealed, look the word up in the dictionary; it gives you a better clue.

Darren King
Yorkton, Saskatchewan

Scoreboard:

Kill as many creatures and get as many items as you can before you venture into the second level in *Dungeons of Daggorath*. The stone giants and the knights are the toughest and the most dangerous. Place everything in front of you before you fight anything. Do not use pine torches on the third level.

In *Sands of Egypt*, the only items I can find are the magnifier, shovel, torch and canteen. Where are the scepter and the dates?

Eric Reitz
Mendham, NJ

Scoreboard:

In *Dungeons of Daggorath*, how do you kill the wizard's image?

In *Dallas Quest*, how can I pass the bay with the monkey without sinking?

Marc Paulin
Lameque, New Brunswick

Scoreboard:

In *Dungeons of Daggorath*, during a fight, find a good safe spot and drop most or all of your inventory. Most creatures will not attack you until they pick up everything on the floor. While they are picking up the objects, attack them. This works on all creatures except the scorpions, wizard's image and, of course, the wizard.

Stephen Dodgen
Pascagoula, MS

Scoreboard:

In *Rogue*, how do you kill a griffin? I try to polymorph them, but by that time I'm too weak. Is the Amulet of Yendor always on Level 26? I made it to that level but never found the amulet.

Kirk Marshall
Westport, MA

Scoreboard:

In *Rogue*, when you get to Level 6, or where there are sleeping leprechauns, don't try and hit them. Shoot them with a crossbow or bow from the farthest distance possible but still be in the same room and shoot at them until they are dead. Sometimes you can get 500 gold pieces.

In *Blackbeard's Island*, where do you fish for the anchor?

Cory Harris
Janesville, WI

Scoreboard:

In *Pyramid*, after you have the eggs and the key, use the key to open the sarcophagus. To cross the pit, wave the scepter. You do not have to worry about the batteries; they will be replaced automatically after your lamp goes out.

Keep in mind buying the batteries prevents you from winning the game.

In *Sands of Egypt*, try looking at the carving and have your snake oil ready.

In *Bedlam*, certain things cannot be accomplished unless they are part of the solution. To open the painted door, you must first meet Picasso, then get a lobotomy. If the painted door is in your cell after this, you can open it.

To kill the dog, put the pill in the meat and feed the meat to the dog.

To get the torch in *Sands of Egypt*, go south twice from the cliff and dig. Also, the rope is a hint; it will come in handy below the pool. The dates are at the top of the tree.

In *Madness and the Minotaur*, you score points by getting spells, or returning treasures to the forest. The Power ring, Light ring, Truth ring and Spell-book are also treasures.

To escape the maze: In the area with up and down exits in every room, go south as far as you can go and then go east as far as you can go. This should put you in the non-random part of the maze. Find the dead-end room with the small pit in the corner and jump it.

To get the first spell, find the food and the mushroom, and go to the first floor room where the air is crackling with enchantment.

After you get all the points in *Pyramid* and *Raaka-Tu*, how do you win? I can get all the points but the game does nothing.

Paul Riddle
Sykesville, MD

Scoreboard:

In *Pyramid 2000*, don't waste time or your coins. The pots are delicate and need soft ground. After you can locate all the treasures, start over and try to go through it in less moves before your light dies.

In the *Interbank Incident*, how do you find the crooks?

Adam Brower
Bossier City, LA

Scoreboard:

In *Dallas Quest*, how do you use the

dinghy? In *Gates of Delirium*, how do you use the OTHER command to get allies?

Paul King
Nashville, TN

Scoreboard:

In *Dallas Quest*, I can't get past the giant rat to get the small shovel. In *Sands of Egypt*, I can only get to the part where I see the shovel and then I die of thirst.

In *Bag-It-Man*, I get all the money into my hide-out; then I get stumped because the money is in the hide-out and I am getting chased all over by guards. In *Blackbeard's Island*, I get the coconut, but there is no way of opening it.

In *Preserve Quandie*, I can't find the right password.

Thomas Crowe
Villa-vicencio, Meta, Colombia,

Scoreboard:

How do you get the flashlight in *Dallas Quest*?

Ric Yates
Corpus Christi, TX

Scoreboard:

I can't seem to find the dates used to feed the camel in *Sands of Egypt*, and I don't know what to do with the snake oil once I get to the pool. Also, where is the scepter?

Matt Hoyer
Chatsworth, CA

Scoreboard:

I have the dates and have arrived at the pyramid in *Sands of Egypt*, but I found out I needed the snake oil. Before I found this out, I typed HELP and it said, "Did you have any good dates lately?" Does that mean I have to eat them?

Curtis Schaaf
Moro, IL

Scoreboard:

In *Hitchhiker's Guide to the Galaxy*, you must block the bulldozer until Ford Prefect arrives. How do you get past the Bugblatter Beast to the opening to the west from his inner lair? How can you steal the heart of gold after the guards drop their rifles, and how can you get past the screening door on the ship?

In *Sands of Egypt*, you can't take the treasure. You must return to civilization and tell about it. To leave the underground river, you must get the ladder from the treasure room and climb out the drain from the boat.

In *Zork I*, what do you do in the shaft room, and what purpose does the scepter serve? Can you get rid of the granite wall?

John Austin
Clifton, TX

Scoreboard:

In *Hitchhiker's Guide to the Galaxy*, how do you get the vector plotter and keyboard, and how do you get past the screening door?

Stevie Nakahara
Garden Grove, CA

Scoreboard:

In *Trekboer*, I can get by the first spider, but I can't get by the second one.

Robert Johnston
Toledo, OH

Scoreboard:

In the *Interbank Incident*, what's the IBC gold card's code number? In *Sands of Egypt*, how do you get the treasure?

In *Dr. Avaloe* from the *First Rainbow Book of Adventures*, to get out of the first room, type LOOK HOLE then DOWN HOLE. In *Planetfall*, how do you get the key in the crevice?

How do you get the bird statue in *Pyramid*?

Phil Derksen
Hendersonville, NC

Scoreboard:

How do you open the safe in *Vortex Factor*?

David Whyburd
Peace River, Alberta

Scoreboard:

In *Blackbeard's Island*, what do I do with the anchor? How does it become a grappling hook?

Stu Scott
Sandyhook, CT

Scoreboard:

In *Sea Quest*, I can only find the anchor, pearl, diamond ring and silver. Is there anything else to be found?

In *Shenanigans*, how do I find the clover field?

Ted Scarbrough
Clarkston, GA

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to: EDITORS. Be sure to include your complete name and address.

— Jody Doyle

Parlez-Vous CoCo Français?

By Joseph Kolar
Rainbow Contributing Editor

Educational programs intrigue me, and foreign languages have always sustained my interest. Naturally, I inspected the CoCo 3 to see if it could be utilized in these areas.

Having constructed various language programs in German, French, Italian, Spanish, Portuguese, Romanian, not to mention Japanese and Russian, I discovered that a great disadvantage of older CoCos is their inability to quickly and effortlessly create unique letters formed of various diacritical marks and shapes inherent to specific languages.

You are all familiar with the double-dot (umlaut) that graces some German vowels. You are also probably aware of the slant accents over vowels in French, Italian or Spanish. These marks indicate a specific phonetic value for a vowel or consonant.

CoCo 3 makes most of these special diacritical marks available in the Hi-Res mode.

Back up a minute. We previously learned about the ASC function. Briefly, it converts a character or string variable to its corresponding ASCII decimal number. CHR\$ works like a mirror image of ASC and retrieves a single character that is represented by the ASCII decimal number code.

All CoCo owners, pay attention! Key in:

```
1 CLS
10 PRINT@140,,:INPUTX
20 Y$=CHR$(X)
30 PRINT@142," "Y$;X
40 GOTO10
```

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

Run, and enter a value of 75, which will be our ASCII value. CoCo, using the CHR\$ function, obligingly spits out the character representing the ASCII decimal number.

In order to get CoCo to place the input question mark in the upper-middle of the display, I specified a particular 32-by-16 screen PRINT@ address: Line 10 does this. To make this stratagem plainer, quotes should have been inserted in front of the semicolon, but they are optional. To obliterate the prompted value, Line 30 uses another PRINT@ with two spaces enclosed within quote marks. The blanks overprint the ASC value input, and both the CHR\$ and ASC values are displayed side by side.

Try various numbers from 33 to 255 and see what is what.

A note of caution: If you have a Hi-Res program in CoCo 3 and then enter NEW instead of OFF and ON to load a Lo-Res program that doesn't have a WIDTH32 statement in it, you are apt to be astounded with an HP Error. Merely type in and enter WIDTH32 to get into sync with domineering CoCo 3.

Type and enter 5 WIDTH32. Run and enter a value of 75. So far, so good. Now enter 5 WIDTH40 and run. Indignant CoCo 3 gives us an anticipated HP Error message.

We suspect that PRINT@ is a no-no in Hi-Res CoCo 3. We convert to LOCATEa,b and search for equivalent a,b values. A guess of 15,4 comes close, but 16,4 is a good replacement. Try entering LOCATE16,4:, and run. Oops! CoCo 3 protests the other PRINT@ location, and a conversion to LOCATE 19,4: is suitable. Run.

In WIDTH40 we uncover some strange characters residing in ASCII 128 through 159. You will find the entire set

in your manual. For a dynamic look-see, key in:

```
7 FOR X=128 TO 159
35 FOR Y=1 TO 1000: NEXT Y,X
```

Rekey lines 10, 30 and 40:

```
10 LOCATE16,4:INPUTX
30 LOCATE19,4:PRINT Y$;X
40 GOTO7
```

Run, and look at the new immigrants on the block. Save our work as "LOW", if you desire.

To compare the newcomers with the "old residents" in ASCII 128 through 159, key in the following lines:

```
40 WIDTH32
45 FOR X=128 TO 159
50 PRINT@139,X
60 Y$=CHR$(X)
70 PRINT140," "Y$;X
```

(Note three spaces within quotes!)

```
80 FOR Y=1 TO 1000:NEXT Y,X
90 GOTO5
```

Run, and save our work as "HIAND-LOW".

In WIDTH32, ASC(96) will print a reversed @. In WIDTH40, CoCo 3 will print a carat. You might want to change the number 128 to 123 in both lines 7 and 45 to see a few more aliens. Run.

Incidentally, if you want to check out the Lo-Res CHR\$ characters first, press the BREAK key and enter RUN40-. This program has two separate routines that follow each other in a loop. The second one is linked with the first by Line 90.

Now that you have had it up to here with ASC and CHR\$, we shall give our

undivided attention to using some of these "foreigners" in a language program.

If you have the itch, you can make either authentic German or French language text on CoCo 3. For our foreign text we shall select French as the guinea pig. Clear your computer by typing and entering NEW.

Key in listing FRENCHTX on your CoCo 3. If you are not into languages, do not worry if you misspell some words. Just make sure you have the same number of letters. (This is a demo — not a typing test.)

This program is in Hi-Res text mode to enable CoCo 3 to show off the proper accented characters.

Note that I maintain an interval of nine between program line numbers. Usually, Line 0 is reserved for a title. I begin with Line 10.

ON BRK GOT02060 tells CoCo 3 to change over to a 32-by-16 screen and list the program up to Line 1000. This is done in order to position myself at the end of my French text block (50 through 1999) so I could conveniently add more lines in a logical sequence.

I like to use low numbers for GOSUB routine lines because they are short, easy to remember, easy to type and readily found for inspection or consultation at the beginning of a program.

Eight useful characters are found, lines 1 through 8. Look in the manual or inspect HIANDLOW to see which CHR\$() is in each of the GOSUB routines.

After I keyed in lines 1 through 8, I was annoyed to find that I had to go around them to begin the program at

Line 10. That's why I violated my own rule about reserving Line 0 for a title and squeezed in instructions to bypass the GOSUB routines. They are my rules and who ever heard of a rule that didn't have exceptions?

Lines 20 through 40 gave me a Hi-Res text screen, indented my first paragraph and chose both the foreground and background colors.

The text began on Line 50 and continued to Line 250 on the first display page. CoCo 3 was then directed to a GOSUB routine that flashed a blinking prompt message asking CoCo 3 to wait for F1 key to be pressed. If CoCo 3 detected PEEK(343)=191, it knew the F1 key was being pressed and would graciously clear the screen and locate the start of the second page. Otherwise, the CoCo would sit there all night long, waiting for F1 or, as you will see, F2, to be pressed.

The second page was running from Line 265 to 390 when I stopped and called it a day. Line 400 calls the F2 routine at Line 3000, where CoCo 3 inquires if you want to return to the beginning of the program by pressing F2 (if you don't respond, it will take a nap).

Line 45 is dormant. Unmasked, it tells CoCo 3 to go directly to the second working page. This is great when you are working on this page and don't want to be bothered with the first display page distracting you. Lines 1240 and 1999 are fossils from an earlier version of this program.

For the record, the 'e' in CHR\$(130) is called *e accent aigu*; the 'e' in CHR\$(138) is an *e accent grave*; the 'o'

in CHR\$(143) is *o circumflexe*; and the 'c' in CHR\$(135) is the *cedilla*. I had no occasion to use ASC(139) or (148). *C'est la vie!* (That's life!)

Run our program and save it as "FRENCHTX".

Look over the listing and focus in on Line 50. Note that every line of text will begin and end with a blank space. The reason for this will become apparent later. The paragraph is indented to begin at Column 5, and each succeeding line begins at Column 2.

Consider Line 50 to be a bunch of statements tacked together to make up a strip of text on a single row. We have:

```
1) PRINT "En France, un ";:
2) GOSUB1:
3) PRINT "1";:
4) GOSUB2:
5) PRINT "ve doit r";:
6) GOSUB1:
7) PRINT "ussir";
```

These seven segments are glued together with semicolons that tell CoCo 3 to butt each succeeding statement to that of the preceding one. Provisions for butting-up are made in the GOSUB routines, lines 1 through 8, that house the special characters (look for the semicolon):

- 1) It has both a leading and a trailing blank space.
- 2) The accented 'e', CHR\$(130), begins a word and tacks onto the space allowed for in 1.

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- 3) One lonely letter is added to the accented 'e'.
- 4) Another type of accented 'e' is called by GOSUB2 and attached to the 'l' in 3.
- 5) It adds the rest of the word and continues the text until the next special letter is due. It happens to occur in the middle of a word.
- 6) Another accented 'e' is called up to join the parade of letters.
- 7) Finally, the rest of the word is printed. Note that a blank ending space will be provided. For now, you can't see it, but rest assured that it is there.

This completes the line. How do you know when to begin a new line of text? When you near the end of the line you must become alert. There is no hard and fast rule; it depends on the length of the words involved.

Edit Line 50 by entering EDIT50. Type X to jump to the end of the line. Backspace two spaces. Press the space bar and type ";. This adds the space after the last word. Enter :GOSUB5, enter, and run. This works, but you can see it leaves that strange vowel hanging in the corner.

For argument's sake, let us add the next word to Line 50. Enter EDIT50, and type X to jump to the end of the line. Press I to insert, then press shifted 0, and enter PRINT "1'examen";. Press shifted 0 again, and press ENTER. Run. The word wends its way onto the intervening blank row.

To restore the original Line 50, type and enter EDIT50, pressing X to jump to the end of the line. Backspace 28 spaces, enter ";, and run.

The second text line ends in a long word. There are two options: first, move the entire word to the next available text line; second, break the word up into syllables.

How the text is ultimately formatted is your business. You are the typesetter. You may strive to keep a few blank spaces at the right margin. I tried but violated my own rule, as the last two lines on the first display page will attest. It seems to flesh out the text and appeals to me.

Press F1. The second page is merely a continuation of text presentation and could go on and on and on. I pooped out in the middle of the second display page and called it a day. You might consider relocating the flashing legend, Line 3000, to the 15th row.

Enter EDIT3000 and press the space bar until the cursor is under the 2. Type 2C, then type 15, and press ENTER. Run. Now it looks bad and conflicts with the text. Back to the drawing board! Return Line 3000 to its original state.

Follow Line 70 and every succeeding text line, and you will find that your prime concerns are dual: first, to provide spaces where required; and second, to end each line of text in a neat manner allowing for a right margin.

Suppose we change the color to make neat, colorful strips of text? Enter EDIT40 and press X. Backspace one space, type 7, press ENTER, and run. Look at the three orange squares at the left edge. The last space of each of the offending lines ran over to the next row, spoiling the effect we labored so hard to achieve.

It would be a lot of unproductive work to clear this up. "Depend" would

have to be hyphenated, requiring an extra ribbon of text because, as luck would have it, it is the very last word of the paragraph. It also says something about lousy planning.

The last two text lines should also be pushed to the following text strips, and this will inevitably run over and disturb the second display page.

Enter EDIT265, press X and type and enter :ATTR4,7. Run, and press the F1 key. See how nice the second page is? Press F2. In conclusion, it is easier to hide the orange squares.

Type and enter 235 LOCATE0,20 :ATTR0,5. Enter EDIT240, press X, type :ATTR4,7, and press ENTER. Enter 255 LOCATE0,22:ATTR0,5, and run.

We did not need to restore the orange strip color further because we already edited Line 265. Save our work now, if you want.

It's too bad the people at Microsoft didn't create the nasalized 'n' (as in canyon) so that Spanish language programs could be developed.

German programs can be created with the three double-dot vowels and with CHR\$(141) to simulate the "double s" consonant.

It is safe to say that you now know how to utilize some of the odd-ball characters in Hi-Res text. This includes CHR\$(96) and from (123) to (159). You never know when you might call on CoCo 3 to produce these unusual characters.

I hope you enjoyed the editing practice provided and received encouragement to continue to study all these little nitty-gritty features of CoCo 3. □

Listing 1:

```

Ø '<HIANDLOW>
1 CLS
5 WIDTH4Ø
7 FOR X=128 TO 159
1Ø LOCATE16,4:'INPUTX
2Ø Y$=CHR$(X)
3Ø LOCATE19,4:PRINTY$;X
35 FOR Y=1 TO 1ØØØ:NEXTY,X
4Ø WIDTH32
45 FOR X=128 TO 159
5Ø PRINTØ139,X
6Ø Y$=CHR$(X)
7Ø PRINTØ14Ø,"      "Y$;X
8Ø FOR Y=1 TO 1ØØØ:NEXTY,X
9Ø GOTO5

```

Listing 2:

```

Ø GOTO1Ø'<FRENCHTX>
1 PRINTCHR$(13Ø);:RETURN
2 PRINTCHR$(138);:RETURN
3 PRINTCHR$(135);:RETURN
4 PRINTCHR$(147);:RETURN
5 PRINTCHR$(133);:RETURN
6 PRINTCHR$(136);:RETURN
7 PRINTCHR$(131);:RETURN
8 PRINTCHR$(151);:RETURN
1Ø ON BRK GOTO2Ø6Ø
2Ø WIDTH4Ø
3Ø LOCATE5,1
4Ø ATTR4,5
45 'GOTO265
5Ø PRINT" En France, un ";:GOSUB
1:PRINT"l";:GOSUB2:PRINT"ve doit

```



```

r";:GOSUB1:PRINT"ussir";
60 LOCATE2,3
70 PRINT " ";:GOSUB5:PRINT" l'exa
men qui s'appelle le bacca-";
80 LOCATE2,5
90 PRINT" laur";:GOSUB1:PRINT"ea
t (famili";:GOSUB2:PRINT"rement,
le <bac> ou";
100 LOCATE2,7
110 PRINT" le <bachot>) avant de
pouvoir entrer";
120 LOCATE2,9
130 PRINT " ";:GOSUB5:PRINT" l'un
iversit";:GOSUB1:PRINT". Est-ce
important?";
140 LOCATE2,11
150 PRINT" C'est plus qu'importa
nt; c'est un";
160 LOCATE2,13
170 PRINT" drame dans la vie de
chaque jeune";
180 LOCATE2,15
190 PRINT" Fran";:GOSUB3:PRINT"a
is. Tout son avenir en d";:GOSU
B1:PRINT"pend.";
200 LOCATE5,17
210 PRINT" On passe l'examen dan
s toute la";
220 LOCATE2,19
230 PRINT" France au m";:GOSUB6:
PRINT"me moment; les copies des"
;
240 LOCATE2,21
250 PRINT " ";:GOSUB1:PRINT"l";:G
OSUB2:PRINT"ves sont ensuite cor
rig";:GOSUB1:PRINT"es non pas";
260 GOSUB2000
265 LOCATE2,1
270 PRINT" par leurs professeurs

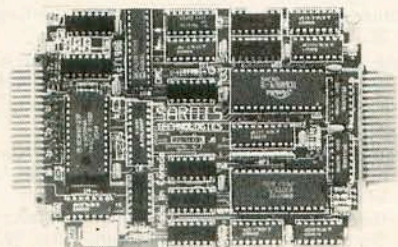
```

```

";:GOSUB5:PRINT" eux, mais";
280 LOCATE2,3
290 PRINT" par des <correcteurs>
qu'ils ne";
300 LOCATE2,5
310 PRINT" connaissent pas -- et
qui ne les";
320 LOCATE2,7
330 PRINT" connaissent pas. Le
bac ";:GOSUB1:PRINT"tant un";
340 LOCATE2,9
350 PRINT" examen difficile, il
y a toujours";
360 LOCATE2,11
370 PRINT" une proportion consid
";:GOSUB1:PRINT"rable d";:GOSUB
1:PRINT"l";:GOSUB2:PRINT"ves";
380 LOCATE2,13
390 PRINT" qui ";:GOSUB1:PRINT"c
houent.";
400 GOSUB3000
1240 'GOSUB3000
1999 GOTO1999
2000 LOCATE8,23:ATTR3,5,B
2010 PRINT" PRESS <F1> TO CONTI
NUE. ";
2020 ATTR5,5:LOCATE0,0
2030 IF PEEK(343)=191 THEN 2040
ELSE2030
2040 CLS:LOCATE5,1:ATTR4,5
2050 RETURN
2060 WIDTH32:LIST-1000
3000 LOCATE5,23:ATTR3,5,B
3010 PRINT" PRESS <F2> TO RETUR
N TO START. ";
3015 ATTR5,5:LOCATE0,0
3020 IF PEEK(344)=191 THEN 0 ELS
E 3020

```

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One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple. Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPV/II/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

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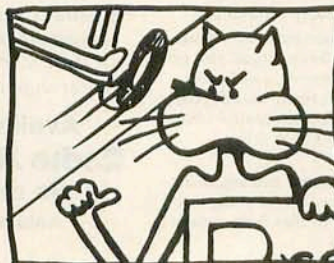
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December 1987 THE RAINBOW 151



Pak to Disk Transfer

By David Dawson

After two days of working with my new CoCo 3, only a dozen programs refused to work. Considering I have collected nearly 2,000 programs over the years, this is quite good. A few did require patches, though, and the program appearing here is one of the most significant.

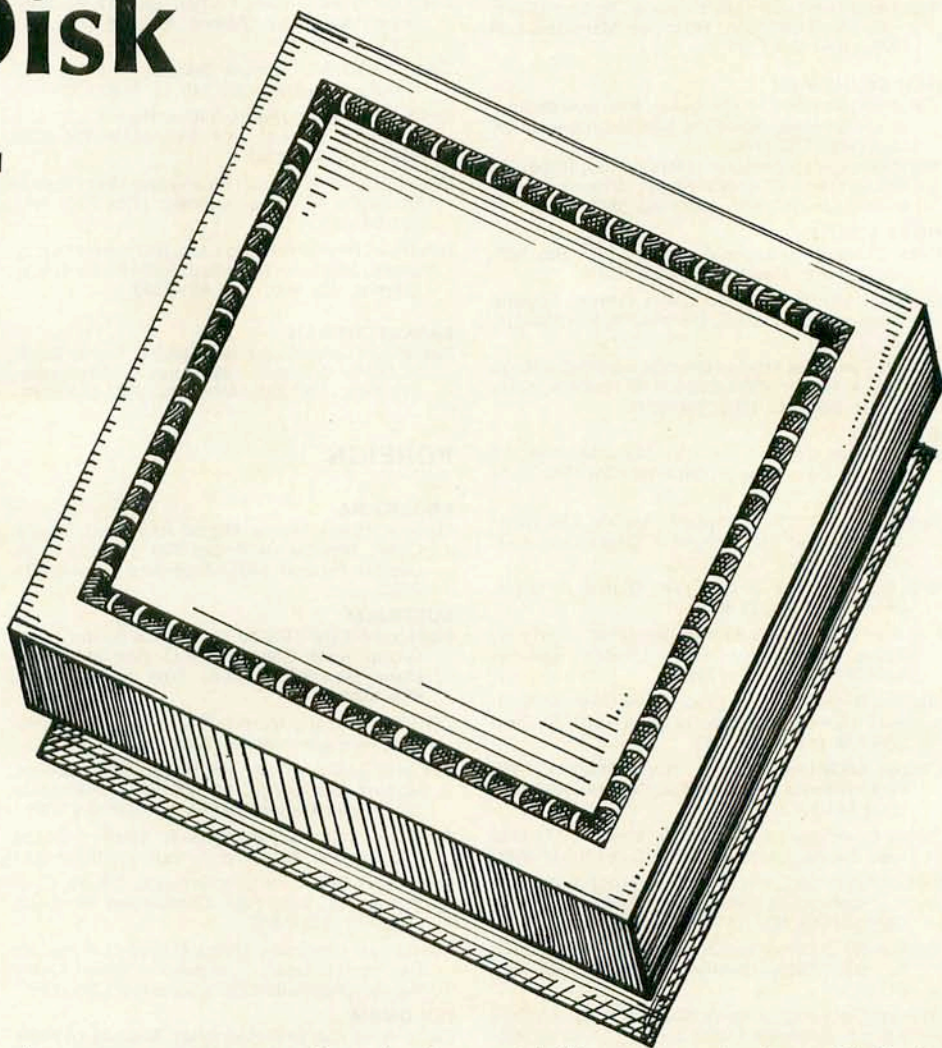
Although almost everything worked without problem, many ROM packs I acquired long ago that were transferred to disk would no longer work.

The patch program I had been using up to the purchase of the CoCo 3 is one that appeared in *HOT CoCo* in September 1983, written by Doctor ASCII, Richard Esposito. I obviously needed a new patch and, after trying several strategies, I was stumped since the only CoCo 3 manual I have is the one Radio Shack sells with the computer.

I found the solution by studying Esposito's column in the January RAINBOW (Page 167) and by understanding the CoCo's new GIME chip. I realized the memory locations beginning with hexadecimal \$FFA0 control memory that appears in a memory map area. For example, the value in \$FFA0 determines the actual memory seen by the Color Computer in the locations 0000 to 2000 (Hex) or 70000 to 72000 in the new memory map notation.

So, if you wanted (though you would have to write your own operating system), you could have a single 8K block

David Dawson is currently completing his doctorate in human factors psychology. David, his wife, Leigh Anne, and his son, Adam, all enjoy their CoCo 3.



of memory appear many times in the memory map, which is exactly how the short assembly language program in Listing 1 works. The program pack code is loaded into normal program memory where any BASIC program might reside; then my patch tells the GIME that this is the program pack memory and replaces this newly moved memory with a block from the upper 64K.

Using the Program

There is no need to get out your assembler or to type in Listing 1; the BASIC program in Listing 2 contains a loader for the machine code. I have also included part of the code that appeared in *HOT CoCo*. Including this allows my program to test and do the old CoCo

patch if you are not using a CoCo 3. This makes this patch downwardly compatible.

To use the program, you must either have some patched ROM packs on disk or save the contents of a ROM pack to tape before running this program.

To save a program pack to tape, merely expose the ROM pack's connections and tape the far-left one (if you orient the ROM pack label side down with the connections facing away from you). Then insert the program pack with the power off. Power up the computer and you should get the normal sign-on message — if you do not, recheck the lead you taped and make sure the program pack is securely inserted.

Next, prepare the tape recorder, type `POKE&HFFDE,0:CSAVEM"filename",`

&HC000,&HFEFF,&HC000 and press ENTER. When the tape stops, turn the computer off again, reinsert the disk controller and run the program shown in Listing 2.

The program is straightforward as long as you have either a tape dump of the ROM pack code or a disk program that was patched with Esposito's original program. If you attempt to repatch a disk program modified in some other way, you will get an error message.

Also, due to the nature of the original programming, some ROM Paks *cannot* be transferred with my program as it stands.

(Questions about this program may be addressed to the author at 434 N. Pine St. #31, Vermillion, SD 57069. Please enclose an SASE when writing for a reply.) □

Listing 1:

```

3F48      80FD  00100  ORG 16200
3F48 B6      32  00101  LDA 33021 ROM VERSION NUMBER
3F48 81      32  00102  CMPA #50 IS IT A COCO 3?
3F4D 27      03  00103  BEQ COCO3
3F4F 7E      3F9A 00104  JMP 16282 IF NOT DO COCO 1&2 FIX
3F52 1A      50  00110  COCO3 ORCC #50 KILL INTERRUPTS
3F54 86      7A  00120  LDA #57A SELECT BANK AT PRESENT MEM 16384
3F56 B7      FFA6 00130  STA $FFA6 AND BANK IT TO CARTRIDGE MEMORY
3F59 86      7B  00131  LDA #57B ALSO BANK NEXT 8K..
3F5B B7      FFA7 00132  STA $FFA7 ..TO CARTRIDGE MEMORY
3F5E 86      70  00133  LDA #570 THEN BANK 8K FROM..
3F60 B7      FFA2 00134  STA $FFA2 ..EXTENDED MEMORY TO REPLACE
3F63 86      71  00135  LDA #571 ..AND ANOTHER 8K
3F65 B7      FFA3 00136  STA $FFA3
3F68 7E      C000 00140  JMP $C000 AND JUMP THERE
          0000  00150  END

```

00000 TOTAL ERRORS

Listing 2: PAKXFER

```

10 WIDTH 32
20 PMODE 0:PCLEAR1: CLEAR 200,160
30 CLS
40 PRINT STRING$(32,"*");
50 PRINT "COCO 3 ROM FIX AND ROM
   PATCH"
60 PRINT "BY DAVID LIONELL DAWSON"
70 PRINT "COCO 1/2 CODE BY R. ESPOSITO"
80 PRINT STRING$(32,"*")
90 PRINT:PRINT
100 PRINT "MODE:"
110 PRINT "  A: PATCH 'ROMFIXED'
   DISK FILE"
120 PRINT "  B: PATCH ROM CODE ON
   TAPE"
130 INPUT "*****WHICH";A$
140 IF A$<>"A" AND A$<>"B" THEN
100
150 IF A$="B" THEN 220
160 INPUT "DISK FILE NAME";FA$
170 LOADM FA$
180 IF PEEK(&H3F9A)<>&H0F THEN C
LS:PRINT"SORRY NOT CORRECT FORMAT":END
190 GOSUB 300:'ADD PATCH
200 INPUT "SAVE <A>8K OR <B>16K
   ON DISK";A$:IF A$="A" THEN SAVEM
   FA$,16200,24577,16200 ELSE SAVE
   M FA$,16200,32751,16200
210 PRINT:PRINT"PATCHED VERSION
   ON DISK":END
220 INPUT "TAPE FILE NAME";FA$
230 CLOADM FA$,&H8000
240 GOSUB 300:'COCO3 PATCH
250 GOSUB 410:'COCO1&2 PATCH
260 INPUT"DISK FILE NAME";FA$:FA
$=LEFT$(FA$,8)
270 INPUT "SAVE <A> 8K OR <B> 16
   K";A$:IF A$="A" THEN SAVEM FA$,1
   6200,24577,16200 ELSE SAVEM FA$,
   16200,32751,16200
280 END
290 'COCO3 PATCH
300 FOR I=&H3F48 TO &H3F6A
310 READ A$
320 POKE I,VAL("&H"+A$)
330 NEXT I
340 DATA B6,80,FD,81,32,27,03,7E
350 DATA 3F,9A,1A,50,86,7A,B7,FF
360 DATA A6,86,7B,B7,FF,A7,86,70
370 DATA B7,FF,A2,86,71,B7,FF,A3
380 DATA 7E,C0,00
390 RETURN
400 'COCO1/2 PATCH
410 FOR I=&H3F9A TO &H3FFE
420 READ A$
430 POKE I,VAL("&H"+A$)
440 NEXT I
450 DATA 0F,71,1A,50,8E,80,0,A6,
   84,B7,FF,DF,A7,80
460 DATA B7,FF,DE,8C,C0,0,26,F1,
   B7,FF,DF,86,7E,B7
470 DATA A0,51,CC,A0,72,FD,A0,52,
   CC,8E,9F,FD,A0,84
480 DATA CC,FE,7E,FD,A0,86,CC,A0,
   93,FD,A0,88,7F,80
490 DATA 00,0F,71,86,7E,B7,A0,CB,
   CC,3F,E3,FD,A0,CC
500 DATA 7E,A0,27,CC,C0,00,97,45,
   CC,DF,FF,DD,41,CC
510 DATA 40,00,DD,47,CC,5F,FF,DD,
   43,BD,AC,20,1C,AF
520 DATA 7E,C0,00
530 RETURN

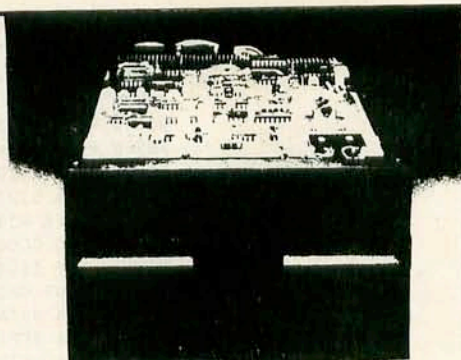
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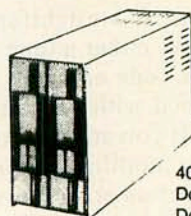
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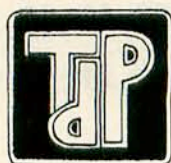
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



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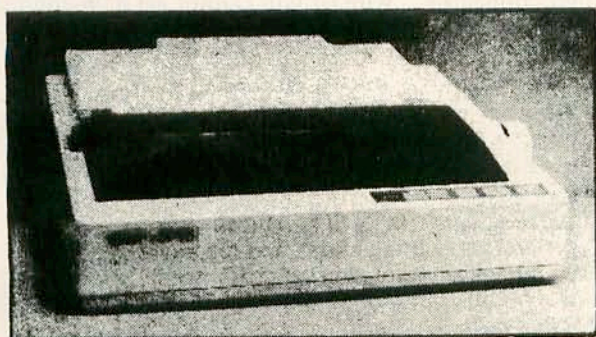
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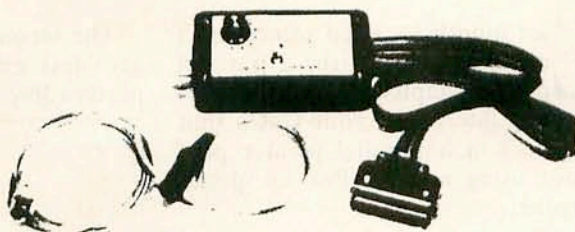
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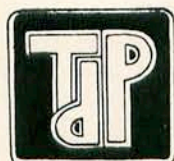
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By Tony DiStefano
Rainbow Contributing Editor

Last month I started something I now have to finish, a parallel printer adapter for your CoCo — something internal to your CoCo that will give you a parallel printer port without using a Multi-Pak or special controller.

Last month was the hardware side of this two-part project, which I'll review quickly. A small PCB that goes inside your computer has three ICs on it and connects to the inside of the cartridge connector. It also has a 36-pin connector. This connector can be connected to any Centronics type parallel printer. The hardware uses two bytes to talk to the printer. The first, at \$FF50, is the latch to which the character to be printed is located. The second, located at \$FF58, is a readable bit that shows the state of the printer, busy or not busy. The data at the latch is auto-strobing, which means the second the data is latched, the printer is told about it. You don't have to strobe the printer separately.

This month I will do two things: first, I'll describe how to build (or buy) a printer cable; second, I'll describe the software required to drive this parallel port.

You can get the cable in one of two ways. The simple way is to run to your local Radio Shack and buy a cable. Just ask for a cable to connect a Model 100 computer to any Radio Shack parallel printer (Catalog Number 26-1409).

The second way is a bit harder but also less expensive. You need three parts: a 36-pin ribbon printer connector

(Radio Shack carries it, but at a stiff price), a length of 26-conductor ribbon wire (if you cannot get a 26-conductor,

```

NAM POUT
ORG $0000

START LDX $168
      STX PT2+1,PCR
      LEAX POUT1,PCR
      STX $168
      LDA #$39
      STA START,PCR
      RTS

POUT1 PSHS B
      LDB $6F
      CMPB #$FE
      PULS B
      BEQ POUT2
      JMP $CB4A

PT2   FOR PRINTER

POUT2 TST $FF58
      BMI POUT2
      STA $FF50
      LEAS 2,S
      PSHS B
      CMPA #$0D
      BEQ POUT3
      INC $9C
      LDB $9C
      CMPB $9B
      BLO POUT4
      CLR $9C
      PULS B,PC

POUT3 IS IT CR?
      YES
      INC CHR COUNT
      CHECK END OF PRINT LINE
      END?
      NO
      RESET CHR COUNT

POUT4

END

```

Figure 1: Driver routine for any CoCo

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

get a higher number and split the difference. A common ribbon wire available is a 25-wire. This will do just fine since the 26th wire is not used. Just make sure that the missing wire is not on the pin number 1 side), and a female 26-pin dual inline header. To assemble the cable, start by locating pin number 1 on both connectors. Usually, the ribbon wire will come with a red stripe on the side. Line up Pin 1 of one connector to the red stripe. Push the wire into the connector and crimp the connector. Be careful that the wires align up with the connector teeth. Next, do the same thing with the other connector. That's it, your cable is done. Now it's time to get into that "Do I really have to?" part of the project, yes, the software.

Deep in the ROMs of the CoCo lies software. This software is called BASIC, Extended BASIC and Disk BASIC. Also in these ROMs are drivers that control the computer. Reading the keyboard, displaying a character on the video screen, getting a file from disk and printing a character on a printer are all software functions built into these ROMs. These functions are sometimes

called Basic Input Output Subroutines, or BIOS, for short.

In the case of the CoCo's printer routine, it is in the BASIC ROM. Without going into too many details, the printer routine has what is called a RAM HOOK. If you look in the "Machine Language Subroutines" section of

"With the proper driver, the parallel printer adapter would work with all OS-9 software."

your BASIC manual, you will find one routine that is called CHROUT. This routine will output a character to the device specified by the contents of a byte in memory. The value of that byte will determine which device the character will be sent to. If that value is -2 or \$FE as a signed eight-bit integer, that char-

acter is destined for the printer. But before this character is sent to the printer routine, it goes through the RAM HOOK. This is a few bytes in RAM that, if changed, can re-route the character to your own driver. This is where my routine comes in.

Look at Figure 1, the driver routine for my parallel printer port. It will work with any CoCo. I wrote it using the *Micro-Works* editor/ assembler. You may have to change some things around if you use another package. The first part, called Start, initializes the software by changing the RAM HOOK to POUT1. It then puts an RTS at the beginning of the routine so it cannot be done again. The new printer routine starts at POUT1 and checks the device number to see if the character in question is for the printer. If it is not, the routine continues to where it would normally go had we not changed the RAM HOOK. If the character is for the printer, the routine then moves to POUT2, where the printer is tested to see if it is busy. If it is busy, the software waits in a loop until the printer is free. If the printer is not connected, the software will wait forever.

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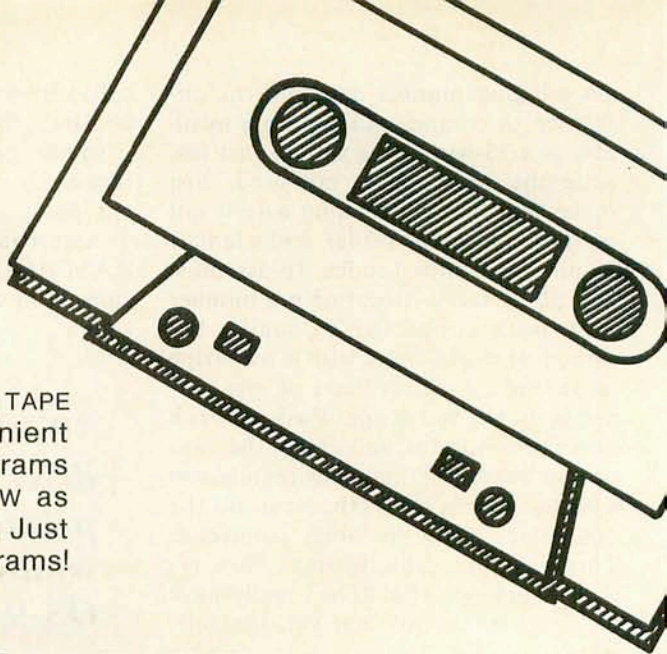
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After it is established that the printer is no longer busy, the software proceeds by sending the character to the printer. By now you would think that your job is finished. No way, there's a little more to go. First, we get rid of the return address, because the character has been processed and must return to whatever software called the printer routine to begin with, avoiding the serial printer routine.

To stay compatible with the regular printer routine, this software must do one more thing — deal with carriage returns. There are two variables used with the regular printer routine: character count and printer line length. Every time a character is output to the printer, the character count is incremented and checked with the printer line length. If it is equal, it is then cleared. When a carriage return is issued, the character count is again cleared. You may ask yourself what use this routine might have. Well, the printer routine itself does not use it, but other routines like TAB use these variables. After all this is taken care of, the routine is finished and returns to its caller.

A few notes to this program are necessary at this time. If you noticed, at the beginning of the routine there is an ORG statement. This tells the assembler where the software is to be loaded in memory. The value after the ORG statement is 0 to make things a little easier for the user. While the program will not function properly when it is assembled, calculation of the offset is made easier.

The loading address of a machine language consists of adding its regular address to the offset. If the regular address is 0, then the offset address becomes the loading address. It is up to the user to determine where this routine must end. Usually, machine language routines are loaded in the top portion

```

ORG $A2F7

FCB $21          CODE FOR BRN

ORG $A2C3

POUT TST $FF58    PRINTER BUSY
      BMI POUT     YES
      STA $FF50    PRINTER DATA
      JMP $A2DF    CONTINUE

```

Figure 2: Driver routine for CoCo 3 only

of memory, protected by the CLEAR command. An offset address must be used, in any case. Another point to this driver is that while all BASIC programs should work fine, machine language programs that choose to ignore RAM HOOKS will not work. The reason is simple — the program does not use the hook; therefore, there is no way that the program will know you have added the extra hardware.

If you use a higher level of software such as OS-9, with the proper driver, the parallel printer adapter would work with all OS-9 software. But, unfortunately, I know little about OS-9 drivers. If there is someone out there who knows enough about it and can write such a driver, send it to me, via THE RAINBOW. I'll check it out, and if it works fine, I'll print it in a future issue.

Figure 2 is another printer driver with a twist. It works only with the CoCo 3. You see, the CoCo 3 always works in the all-RAM mode. When you turn the computer on, it transfers all the ROM data into RAM. While it is impossible to write to ROM, it is possible to write to RAM. This routine is in two parts. The first part is one byte long and

checks to see if the serial printer is ready. We don't need this with the parallel port; this byte defeats that routine. The second part is the printer driver itself. It is not very long — it does not need to be. First of all, it is loaded directly on top of the old serial driver. It does not need to be relocated in memory, nor does it need to be hooked into the RAM HOOK. Next, it does not need to check to see if the character is for the printer; if the software gets this far, it has already determined that it is for the printer. And finally, it does not have to deal with carriage returns, because the rest of the routine does that for you. Another advantage to this is that more machine language programs will work, because it is at the address normally taken up by the serial driver.

Again, some notes for this driver are necessary. The assembler I used for this routine allows for more than one ORG value. Many assemblers allow this, but the area in between must not be filled with zeros if your assembler does not allow it. You can poke the value into memory. Enjoy your parallel printing!



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Galileo and the CoCo

By Debbie and
Dennis H. Weide

Having taken science classes in school every year since elementary school, I always do a science project for the school science fair. Projects are due toward the end of the school year, usually in April or May. In the past, I've always waited until the last minute to get started and end up rushing to finish it. This year, however, I decided to start my project right after school let out last summer. Now, with a new school year in full swing, my project is finished.

This past summer, I was invited to attend a special summer science class taught by scientists from Sandia Laboratories. This class covered many aspects of science including computers and physics. I learned so much that I decided to base my science fair project on these two subjects. With a little bit of research, my CoCo and some hardware I built, I duplicated one of the world's greatest scientist's experiments.

The project works on any version CoCo 1 and 2 with or without disk drives. If you use disk drives, you must use a multipack interface. A 'Y' cable will not work. The PASCAL program automatically switches between disk

and the timer circuit. Place the timer circuit in Slot 1 and the disk controller in Slot 4. Although the PASCAL timer program may not work on the CoCo 3, the BASIC program and timer circuit will work in the CoCo 2 mode. Those using a CoCo 3 can write their own assembly language timer program.

How Galileo Could Have Saved Time

One of the first things most students learn in a physical science course is that, air resistance aside, objects of different weights and sizes dropped from the same height will strike the ground at the same time. I'm sure you've heard of Galileo's experiments on free-falling objects at the Leaning Tower of Pisa. In an attempt to disprove Aristotle's theory that heavy objects fall faster than lighter objects, Galileo took two unequal weights to the top of the tower and dropped them. Much to everyone's amazement, the weights appeared to hit the earth at approximately the same time.

But Galileo believed that lighter objects fell faster, because they struck the ground slightly earlier than the heavier objects. Years after Galileo's death, a scientific explanation of this phenomenon was discovered. When a person releases two unequal weights from his hands, he cannot release them simultaneously no matter how hard he tries. Photographic evidence shows that he involuntarily releases the lighter object first, due to differential muscular fatigue. When holding two unequal weights, his hand tends to grip the

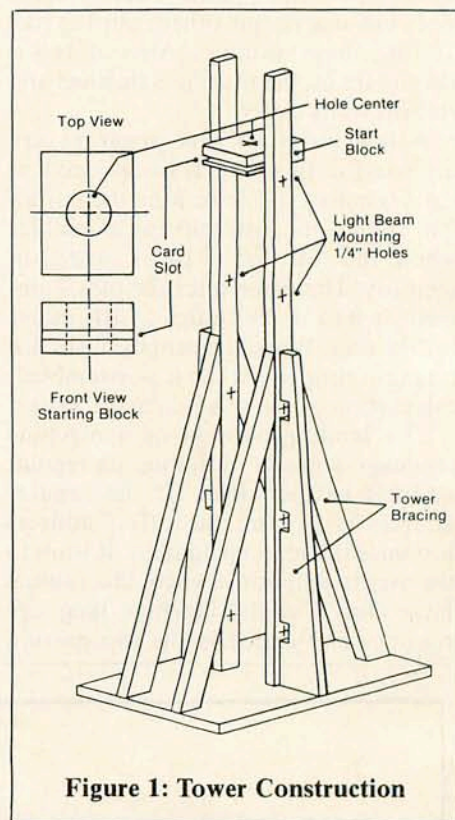


Figure 1: Tower Construction

heavier weight more tightly. Therefore, he will release the lighter object before the heavier one no matter how hard he tries to do otherwise.

Now, if Galileo had owned a CoCo, he could have proved Aristotle wrong in about an hour and saved himself years of research and experimentation. He could have dropped unequal weights from a smaller tower and clocked the time it took for each weight to fall. Although he could not have dropped

Debbie Weide is a junior at Manzano High School and lives in Albuquerque, New Mexico. She is a member of the Honor, Spanish Honor and Thespian societies. Her interests include drama, photography and window shopping. Her father, Dennis Weide, has contributed many articles to THE RAINBOW, but this is her first.

them at the same time, the experiment would be accurate because the weights would be dropped from exactly the same height and would fall the same distance each time.

Tower Construction

In order to duplicate Galileo's experiments (on a smaller scale), I built the tower shown in Figure 1. The crosses shown on the sides of the tower are the light beam mounting holes. They are 1/4 inch in diameter, and on our tower, were spaced 6 inches apart.

If the tower is not plumb (level vertically), the object may not fall through both light beams. I solved this problem by bracing the tower and adding a small plumb bob for tower alignment. The starting block can be placed above any one of the light beams in order to test objects falling from different distances. The cross indicates the center of the hole where the marbles were placed. The card slot holds a piece of paper or a business card and is used to release the marble or ball. My tower was 3 feet tall, but you can make one to your own specifications.

The Hardware

Let's take a look at the event timer

circuit. The circuit was built on a small PC board that plugs into the CoCo ROM port. Power is supplied by the computer. The complete circuit, shown in Figure 2, is laid out in five circuit blocks. I'll describe each block separately, and then explain how it relates to and works with the others.

Clock Circuit

The clock circuit uses a crystal-controlled TTL squarewave oscillator (IC1) to generate a 1 MHz signal. The output is fed to the three 74LS90 decade counters, IC2 through IC4. Each counter divides the input frequency by 10 so that output from IC4 is a 1 KHz squarewave. To count by hundredths and tenths of seconds, additional 74LS90s can be added. Capacitors C1 through C4 are used to keep switching transients out of the power supply and are optional.

Trigger generator

The trigger generator uses two infrared emitting diodes (IRED's CR1 and CR2) and two phototransistors (Q1 and Q2) to generate the triggers required to start (CR1,Q1) and stop (CR2,Q2) the computer program. Be-

cause CR1 is biased to conduct, infrared light is emitted as long as power is applied to the circuit. The IR beam striking the base of Q1 causes the transistor to conduct placing a logic low signal on Pin 1 of IC5. When the light beam is broken, Q1 stops conducting and the output to Pin 1 of IC5 goes high. When the beam strikes the base of Q1 again, the transistor will conduct and its output will go low. The circuit of CR2-Q2 is identical to CR1-Q1.

Trigger Shaper

The trigger shaper circuit includes one 74LS04 (IC5) and two 555 timers (IC6 and IC7). IC5 inverts the pulses from the trigger generator, while IC6 and IC7 shape and lengthen the start and stop triggers. Pin 2 is the input to the 555 timer circuit. While this input is high, the output at Pin 3 remains low. When the input goes low, a trigger whose pulse width is determined by R5 and C7 is present at the output. This trigger has a fixed duration independent of the input trigger duration.

Gate Generator

The gate generator uses a 74LS00 Quad NAND gate (IC8) to generate a

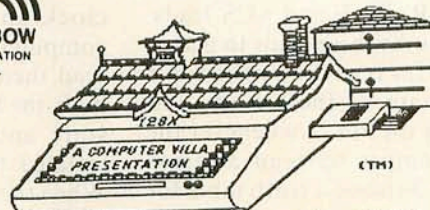
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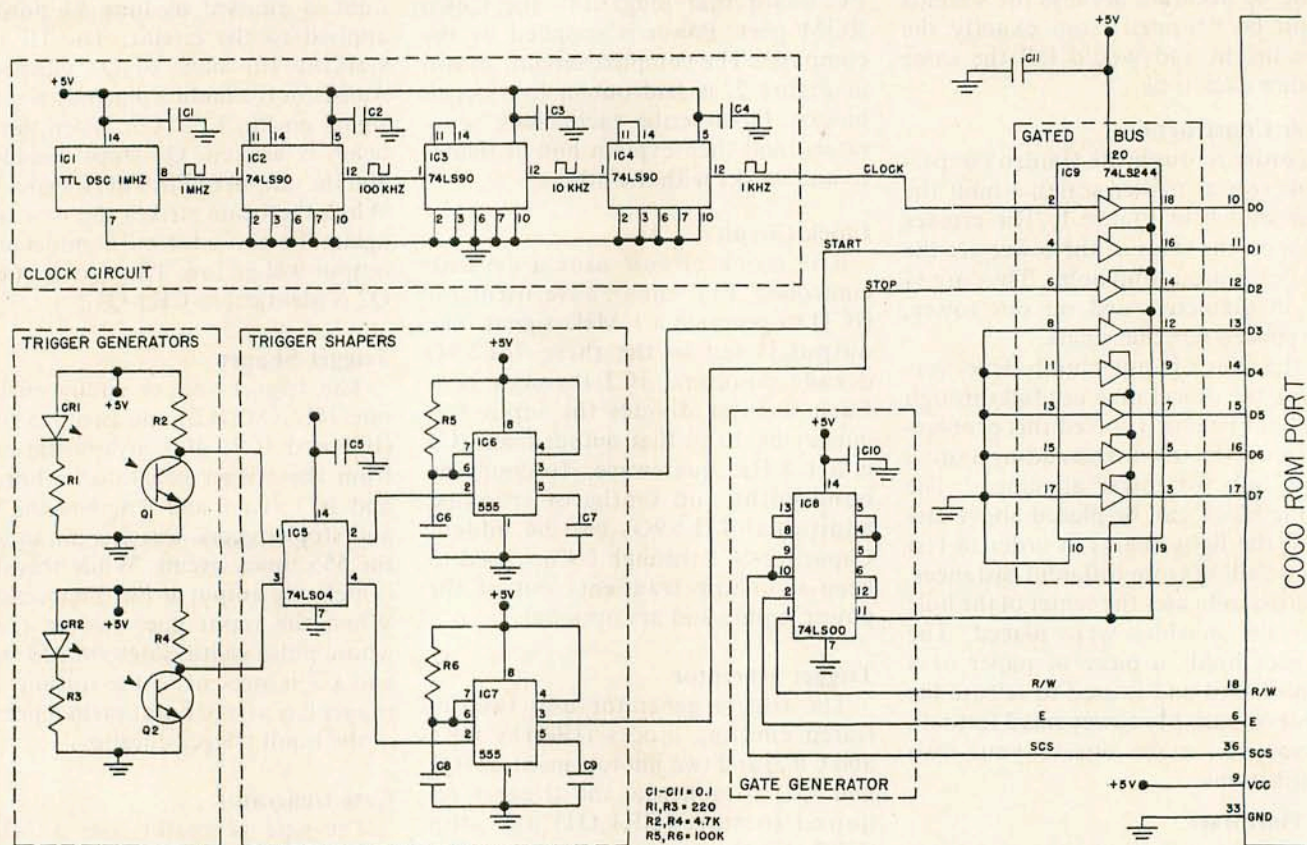


Figure 2: Event Timer Circuit

gate from the R/ \overline{W} , E and SCS leads. The computer uses these leads to access address \$FF40 for reads and writes. IC8 decodes the state of these leads and generates a low on Pin 11 whenever the computer attempts to read address \$FF40. Figure 3 shows a truth table for IC8.

R/ \overline{W}	E	SCS	OUT
H	H	H	H
H	H	L	L
H	L	H	H
H	L	L	H
L	H	H	H
L	H	L	H
L	L	H	H
L	L	L	H

Figure 3: Gate Generator Truth Table

Gated Bus Buffer

The gated bus buffer (IC9) is a tri-state octal buffer used to isolate the

clock and trigger outputs from the computer until the computer is ready to read them. While the gate from IC8 is high, the buffer is in the high impedance state and the event timer circuit is isolated from the computer data bus. When the gate goes low, IC9 is switched on and information from the timer circuit is passed to the computer data bus where it will be read by the computer. The clock, start and stop bits are sent to the data bus on bits 0 through 2. Bits 3 through 7 are held low (grounded) for this circuit but, if desired, can be used for other inputs. When the gate lead again goes high, the timer circuit returns to its high impedance state isolating it from the computer data bus.

Circuit Construction

Circuit construction can be point-to-point or wire-wrapped. I prefer wire wrapping because it makes the circuit easier to modify. Remember to keep the leads as short as possible. I used a small board with a card edge connector (see Parts List, Figure 4) to plug into the ROM port. Any double-sided card edge connector with at least 40 tabs spaced .1 inch apart can be cut to fit. Figure 4 is a parts list with possible sources.

Checking around your area for surplus or discount parts houses may save you lots of money.

The Software

The software for the experiment consists of two programs (listings 1 and 2). Listing 1 is the PASCAL source code for the event timer program. Since BASIC is an interpreted computer language, it executes too slowly to allow fast timing speeds. To ensure accuracy of time measurement, the computer must be able to recognize each half-cycle of the clock squarewave.

We are using a 1 KHz clock signal, so the computer must read the clock pulse at least 2,000 times per second to maintain accuracy. This isn't really that hard, but we are executing additional instructions between each clock read so the number of times we can read the clock each second is reduced. The more often the clock is read, the more accurate our timer circuit will be. I wrote the timer portion of the program using Deft PASCAL, a compiled language that produces relocatable machine code.

Listing 2 is the BASIC program that allows you to time 10 events. It stores the results in memory for final compu-

tation. A screen or printer output is provided. I used BASIC for this portion of the project so that I can easily modify the program to perform different experiments.

Using the Programs

First, load the BASIC program by typing RUN "TIMER". The BASIC program then loads the machine language program. The program will ask whether you want the results of the 10 trials to be displayed on the screen or printed on the printer. After you've made your selection, you're ready to drop the first object. When it passes through the first light beam, a small cross will appear in the upper left corner of the screen to indicate that the computer has begun timing. When the object passes through the last light beam, the computer stops counting and displays the time. It asks if the event was valid. If so, type a Y and the computer will save the event; if it isn't, type N so that the computer will discard the event. When 10 valid events have been completed, the computer will throw out the highest and lowest readings and print the average of the eight remaining values.

Desig.	Part #	Quan.	Price	Source
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CR1-CR2	276-143	2	1.49	Radio Shack
IC1	OSC 1.000	1	3.19	Jameco
IC2-IC4	74LS90	3	.49	Jameco
IC5	74LS04	1	.35	Jameco
IC6-IC7	NE555V	2	.29	Jameco
IC8	74LS00	1	.29	Jameco
IC9	74LS244	1	.79	Jameco
Q1-Q2	276-145	2	.89	Radio Shack
R1,R3	271-015	2	2/.19	Radio Shack
R2,R4	271-030	2	2/.19	Radio Shack
R5,R6	271-045	2	2/.19	Radio Shack

Circuit Board with connector Part # JE413 modified to fit ROM Port available from Jameco Electronics, 1355 Shoreway Blvd., Belmont, CA 94002 for \$7.95

Figure 4: Parts List

The Whole Circuit and Program

Now let's discuss the entire circuit and program. The clock circuit continuously generates a 1 KHz squarewave signal and feeds it to the gated bus buffer. The program instructs the computer to read address \$FF40 (the timer circuit) at least 2,000 times per second by setting the R/W and E leads high and

the SCS lead low each time (refer to Figure 3 again). The gate generator enables the gated bus buffer for each read cycle, allowing the timer circuit information to pass to the computer data bus. As long as the start bit remains low, the program disregards the clock and stop leads.

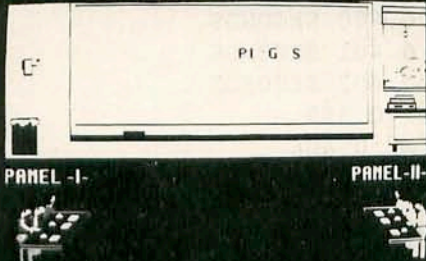
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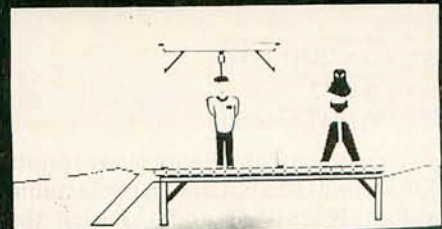
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THE RAINBOW

from CR1, IC6 generates a 1 millisecond high pulse and sends it to Pin 4 of IC9. The computer reads this start pulse and counts the number of times the clock pulse changes state from low to high. When the object breaks the light beam emitted by CR2, IC7 sends a stop pulse to IC9. The computer then stops counting clock pulses, passes the results to BASIC and gets ready for the next event. After 10 valid events, the program exits to the BASIC program where all mathematical calculations and output take place.

My Experiment

My experiment consisted of dropping a steel ball and two marbles (see Figure 5 for dimensions) from the homemade tower. I used a business card in the card slot to support the marble. First, I dropped the marbles and the steel ball from the tower 10 times each. The results are shown in Figure 6. Even though the steel ball is almost four times heavier than either of the marbles, their average times were extremely close. So, it can be assumed that if the human hand could release both weights simultaneously, they would hit the ground at the same time.

Prove Your Results With Equations

After running a few tests, I was curious to know if my readings were accurate. That is, I wanted to make sure I wasn't breaking any laws of nature or gravity. The easiest way to verify the results is to plug the values from my tests into the formulas below and check the results.

$d = .5at^2$ To find distance traveled

$t = \sqrt{2d/a}$ To find time of travel

$a = 2d/t^2$ To find acceleration

You can find these equations in any physics book under the section on acceleration.

For my results, I used the values from Figure 6 and plugged them into the formula for time. The results are shown below.

$$t = \sqrt{2 \times 2.5 \text{ ft} / 32}$$

$$t = \sqrt{5 / 32}$$

$$t = .3952847 \text{ seconds}$$

As you can see from Figure 6, my results (.399 seconds) do not match the formula results (.3952847 seconds). I used the formula below as a cross check.

$$d = .5at^2$$

$$d = .5 \times 32 \times .399^2$$

$$d = 16 \times .159201$$

$$d = 2.547216 \text{ feet}$$

Close, but no cigar.

	Blue Marble	Multicolor Marble	Steel Ball
Weight (oz.)	.1383	.1380	.44224
Diameter (in.)	.54	.52	.55
Avg. Time (sec.)	.399	.401	.399

Figure 5: Size and Weight Statistics

RESULTS OF EXPERIMENTS WITH BLUE MARBLE

THE TEN VALUES ARE AS FOLLOWS:

EVENT # 1	0.398 SECONDS
EVENT # 2	0.400 SECONDS
EVENT # 3	0.399 SECONDS
EVENT # 4	0.398 SECONDS
EVENT # 5	0.399 SECONDS
EVENT # 6	0.398 SECONDS
EVENT # 7	0.399 SECONDS
EVENT # 8	0.398 SECONDS
EVENT # 9	0.399 SECONDS
EVENT # 10	0.398 SECONDS

THE LOW VALUE = 0.398

THE HIGH VALUE = 0.400

8 EVENT AVERAGE = 0.399

RESULTS OF EXPERIMENTS WITH MULTICOLOR MARBLE

THE TEN VALUES ARE AS FOLLOWS:

EVENT # 1	0.404 SECONDS
EVENT # 2	0.403 SECONDS
EVENT # 3	0.400 SECONDS
EVENT # 4	0.400 SECONDS
EVENT # 5	0.404 SECONDS
EVENT # 6	0.400 SECONDS
EVENT # 7	0.399 SECONDS
EVENT # 8	0.400 SECONDS
EVENT # 9	0.401 SECONDS
EVENT # 10	0.402 SECONDS

THE LOW VALUE = 0.399

THE HIGH VALUE = 0.404

8 EVENT AVERAGE = 0.401

RESULTS OF EXPERIMENTS WITH STEEL BALL

THE TEN VALUES ARE AS FOLLOWS:

EVENT # 1	0.399 SECONDS
EVENT # 2	0.399 SECONDS
EVENT # 3	0.399 SECONDS
EVENT # 4	0.398 SECONDS
EVENT # 5	0.398 SECONDS
EVENT # 6	0.398 SECONDS
EVENT # 7	0.399 SECONDS
EVENT # 8	0.398 SECONDS
EVENT # 9	0.399 SECONDS
EVENT # 10	0.398 SECONDS

THE LOW VALUE = 0.398

THE HIGH VALUE = 0.399

8 EVENT AVERAGE = 0.399

Figure 6: Results of Experiments

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Errors and Inconsistencies

The computer is accurate to .001 seconds, so I had to find my error. I started by remeasuring the dimensions of my tower. After measuring from the center of the top IRED beam to the center of the bottom one, I found that I was almost 1/2-inch over the planned 2 feet 6 inches that was supposed to separate the light beams. That accounted for most of my error. In the final analysis, my results were within .001 seconds of what the formula said they should be.

Here are some other things to consider when verifying your results. The starting block must be placed about 1/4-inch above the light beam so the beam will break only after the object is released. This means that the object will have already fallen 1/4-inch before it breaks the light beam. Because an object gains speed as it falls, it has already picked up speed before the timer started counting.

The weather and environment can also affect the results. Some of my experiments were conducted in dry weather (humidity=6%) and some in humid weather (humidity=60%). The readings, much to my amazement, were different. In humid weather the times were slower than in the drier weather. I have no scientific explanation for this, but it would make an interesting science project!

Lastly, you should know that the rate of acceleration of a falling object due to

gravity is not always exactly 32 feet per second. At different latitudes it can equal 32.1 or even 32.2 feet per second. For instance, an object falling at the equator does not fall as fast as the same object falling at the North Pole. Figure 7 shows the rate of acceleration for various latitudes.

Other Practical Uses

This project can be used to time events other than falling objects. If built in the horizontal position, it can be used to time objects traveling horizontally. For example, it could time how fast a model race car or train is going. If the timer and the car are built to scale, scale distances and speeds can be calculated using the formula $S=D/T$ where S is the scale speed, D is the scale distance traveled and T is the time required to travel the distance. Note that since PASCAL stores the results of each event in a 16-bit word when passing it to

BASIC, the program can read only 65,535 clock cycles. Because we're measuring .001 second increments, the maximum amount of time we can clock accurately is 65.535 seconds (65,535/1,000) or just over one minute. By adding another 74LS90 to the timer circuit, we can count .01 second increments and increase the maximum clock time to 655.35 seconds (65,535/100).

This project is not intended to provide step-by-step instructions, but was written to give you ideas for using your CoCo for your next science fair project. Build the circuit and elaborate on it. Experiment using different materials, different distances and different conditions. Most of all, have fun with it!

(Questions about this program may be directed to the authors at 14201 Marquette Dr. NE, Albuquerque, NM 87123. Please enclose an SASE when writing for a reply.) □

Location	Degrees Normal	Elevation (Meters)	Acceleration
Canal Zone	9	0	32.0944
Jamaica	18	0	32.1059
Bermuda	32	0	32.1548
Denver	40	1638	32.1393
Cambridge	42	0	32.1652
Greenland	70	0	32.2353

Figure 7: Rate of Acceleration for Given Latitudes

Editor's Note: The Deft PASCAL source codes for the Timer program will be included on this month's RAINBOW ON DISK under the filename TIMER.PAS.

Listing 1: TIMER.BIN

```
PROGRAM TIMER(INPUT,OUTPUT);

(* EVENT TIMER PROGRAM *)
(* WRITTEN BY D. WEIDE *)
(* COPYRIGHT 1987 *)
(* *)
(* START ADDRESS $4E20 *)
(* END ADDRESS $642F *)
(* EXEC ADDRESS $4E20 *)

CONST ADDRESS=65407;

VAR X,TIME,CURRENTCLOCK,LASTCLOCK:INTEGER;
    RESULT:REAL;

BEGIN
    X:=BYTE[1024];
    PAGE;
    CURSOR(38);
    WRITELN('EVENT TIMER PROGRAM');
    CURSOR(72);
    WRITELN('EVENT NUMBER ',X:2);
    BYTE[ADDRESS]:=0;
    LASTCLOCK:=0;
    TIME:=0;
```

```
(* CHECK BIT 2 (START BIT) *)
(* FOR HIGH. DISCOUNT CLK BIT HIGH *)

WHILE (BYTE[$FF40]<2) OR (BYTE[$FF40]>3) DO
;
X:=0;
BYTE[$0400]:=$2A;
WHILE X=0 DO BEGIN
    CURRENTCLOCK:=BYTE[$FF40];
    CASE CURRENTCLOCK OF

        (* IF CLOCK LOW, RESET *)
        (* LASTCLOCK FLAG *)

            0,2:LASTCLOCK:=0;

        (* CHECK CLOCK BIT HIGH *)
        (* INCREMENT CURRENTCLOCK *)
        (* IF HIGH *)

            1,3:BEGIN
                IF LASTCLOCK=0 THEN BEGIN
                    TIME:=TIME+1;
                    LASTCLOCK:=1;
                END;
            END;

        (* CHECK IF STOP BIT SET *)

        (* IF SET, EXIT CLOCK READ *)
        (* DISREGARD START BIT *)

            4,5:X:=1;
```



```

(*) CHECK CLOCK AND STOP BIT *)
(*) SET. IF BOTH ARE SET, INCREMENT *)
(*) CLOCK AND EXIT CLOCK READ *)

5,7:BEGIN
  IF LASTCLOCK=0 THEN BEGIN
    TIME:=TIME+1;
    X:=1
  END;
END
END;
END;

```

```

BYTE[ADDRESS]:=51;

(*) PRINT RESULTS AND STORE AT *)
(*) ADDRESS 30208 AND 30209 *)

WORD[$7600]:=TIME;
RESULT:=TIME;
RESULT:=RESULT/1000;
CURSOR(355);
WRITELN(RESULT:7:3,' SECONDS ELAPSED')
END.

```

Listing 2: TIMER.BAS

```

1000 ' EVENT TIMER PROGRAM
2000 ' BY DENNIS H. WEIDE
3000 ' & DEBBIE E. WEIDE
4000 ' COPYRIGHT 1987
4500 POKE 150,1:'BAUD RATE
5000 CLEAR 200,19999
6000 CLS:PRINT:PRINTTAB(10)"EVENT
  TIMER":PRINTTAB(6)"BY DENNIS H.
  WEIDE"
7000 PCLEAR1
8000 HI=0
9000 DIM EV(10):CT=1
10000 PRINT:PRINT"YOU WILL TIME
  10 EVENTS, THROWOUT THE HIGH AN
  D LOW VALUES AND AVERAGE THE REM
  AINING EIGHT."
11000 PRINT:INPUT"RESULTS TO SCRE
  EN OR pRINTER>";DEVICE$
12000 IF DEVICE$="P" THEN DEVICE=
  -2 ELSE DEVICE=0
13000 LOADM"TIMER"
14000 PRINT:PRINTTAB(5)"PRESS <EN
  TER> TO BEGIN";
15000 SOUND 100,1
16000 LINE INPUT Z$
17000 POKE 1024,CT:EXEC 200000
18000 PRINT:PRINTTAB(3)"WAS THIS
  A VALID EVENT?";
19000 E$=INKEY$:IF E$="" THEN 190
  0
20000 IF E$="Y" THEN CT=CT+1:EV(C
  T)=PEEK(&H7600)*256+PEEK(&H7601)
21000 IF CT=10 THEN 22000 ELSE 170
  0
22000 CLS:PRINT#DEVICE,TAB(1)"THE
  TEN VALUES ARE AS FOLLOWS:"
23000 FOR X=1 TO 10:PRINT#DEVICE,
  TAB(1)"EVENT #";X;TAB(15);"";
24000 PRINT#DEVICE,USING "##.###
  SECONDS";EV(X)/1000:NEXT X
25000 FOR X=1 TO 10:IF EV(X)>HI T
  HEN HI=EV(X)
26000 NEXT X
27000 LO=HI
28000 FOR X=1 TO 10

```

```

29000 IF EV(X)<LO THEN LO=EV(X)
30000 NEXT X
31000 PRINT#DEVICE,USING " THE LO
  W VALUE = ##.###";LO/1000:PRINT#
  DEVICE,USING " THE HIGH VALUE =
  ##.###";HI/1000
32000 FOR X=1 TO 10:IF EV(X)=LO T
  HEN LO=X
33000 IF EV(X)=HI THEN HI=X
34000 NEXT X
35000 TL=0
36000 FOR X=1 TO 10:IF X=LO OR X=
  HI THEN 38000
37000 TL=TL+EV(X)
38000 NEXT X
39000 PRINT#DEVICE,USING " 8 EVEN
  T AVERAGE = ##.###";(TL/1000)/8

```

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Compression Filters in Saving and Restoring Graphics Screens

By Peter Dibble

I wasn't at all happy with the speed of the programs I wrote to save and restore graphics screens. About four and a half minutes to save a screen to disk is dreadful. Three and three quarters minutes to restore the screen is even worse. Both programs need help, but since I wrote the program to dump the screen to disk first, I'll fix it first.

I tried fiddling with the screen dump program in its BASIC09 code and got some improvement out of it, maybe 20 or 30 seconds. Since I was looking for a four-fold improvement, I needed to try something else.

Recoding the program in C might have done the trick. C programs are always faster than similar BASIC09 code. However, those of you with C compilers have probably already done the translation, and the people without C wouldn't want to type in the executable file for the resulting program. (C programs usually generate big modules.)

Peter Dibble has a bachelor's degree in chemistry and is currently a graduate student in computer science. He has worked as an applications programmer, systems programmer and as the user services assistant director for the University of Rochester Computing Center. With Dale Puckett, he is co-author of The Complete Rainbow Guide to OS-9 and the first volume of The Complete Rainbow Guide to OS-9 Level II.

Once a BASIC09 or C program is as fast as possible, we usually turn to assembly language. Recoding our entire program in assembly language would be

the leave-no-stone-unturned way to speed up the program, but it would be wasteful. Most of the screen dump program makes only a tiny contribution

Listing 1: RLSqsh.CDump

```

1: 87CD 00C8 000D 1181 E000 135708.
2: 1408 D152 4C53 7173 E801 49877.
3: 0F01 5F0F 0230 C904 099F 23689.
4: 074F DD05 3049 9F03 8D29 56727.
5: 9701 8D25 250F 9101 2607 100655.
6: C10F 2403 5C20 F18D 0920 113454.
7: ED8D 058D 6E10 3F06 5858 171672.
8: 5858 DA01 8D49 C600 9701 103119.
9: 390D 0226 118D 1725 0C97 38507.
10: 0044 4444 4484 0F03 021C 34916.
11: FE39 9600 20F5 4310 3F06 169516.
12: 9C03 2618 3404 8600 108E 90014.
13: 0400 3049 103F 8925 0D1F 15685.
14: 2031 8B10 9F03 3504 4FA6 53644.
15: 8039 C1D3 26D8 4335 8434 124072.
16: 129E 0710 9E05 108C 0400 57416.
17: 2602 8D0E E780 9F07 3121 49783.
18: 109F 0535 9210 9E05 30C9 59437.
19: 0409 8601 103F 8A25 AD10 24702.
20: 8E00 0010 9F05 39A5 3B21 80163.
21: .0

```

Listing 2: SaveImage

```

PROCEDURE SaveImage
0000 DIM FileName:STRING[99]
000C INPUT "Image file name: ",FileName
0025 RUN compress(FileName)
002F END

```




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to the program's run time. Even if the translation to assembly language reduced the time of the unimportant parts of the program to zero, it would make practically no difference in the program's speed. The most efficient way to use assembly language is to choose the parts of the program that use the most time and recode only them.

The most expensive part of the screen dump program is the section where it compresses the buffer and writes it to disk. The program seems to spend more than 75 percent of its time here. I decided that replacing it with assembly language should make a big difference to the program's speed — maybe close to the factor of four that I wanted.

It turns out that the part of the program I chose to improve does run length encoding. The nybble encoding method I use is specialized, but not so specialized that this program is the only one you would ever want to use it for. In fact, it looks like it would be a good program to have around. Unfortunately, subroutines for BASIC09 programs are of no use without other programs to call them.

Compression Filter

The easiest way to write a run-length encoding program is as a filter, a program that reads from standard input and writes transformed data to standard output. Since all OS-9 programs start with standard input and standard output open, you don't need to worry about filters having filenames and opening files. Filters got their name because they are often inserted in pipes where they "filter" data.

BASIC09 programs can call filters. It takes a little work and costs a little time, but it lets us use a run-length encoder filter instead of a subroutine. It also moves the filter into an address space separate from the rest of the program. If we were tight for memory, the second address space might be an advantage.

My first filter was simple, but slow. It read and wrote one byte at a time, and the OS-9 overhead was killing the program. My second attempt read and wrote 100-byte buffers. It was much faster.

The best size for the buffer is hard to choose. Every increase in buffer size makes the program run faster, but after the buffers reach about 100 bytes, further increases don't make much difference. On the other hand, the CoCo hands out memory in 8K chunks; so a program that uses only a few hundred bytes is wasting the rest of the 8K. I

```
PROCEDURE Compress
0000    PARAM OutFileN:STRING[99]
000C    DIM OutPath:BYTE
0013    DIM OutPipe:BYTE
001A    DIM buffer(7680):BYTE
0026    DIM section:INTEGER
002D    DIM position:INTEGER
0034    DIM WinType,horiz,vert:INTEGER
0043
0044    CREATE #OutPath,OutFileN:WRITE
0050    RUN GetWinAttr(1,WinType,horiz,vert)
0067
0068    REM Write the window attributes into the image file
009A    PUT #OutPath,WinType
00A4    PUT #OutPath,horiz
00AE    PUT #OutPath,vert
00B8
00B9    RUN MakPipe("RLSqsh",OutPipe,OutPath)
00D1
00D2    FOR section:=1 TO 4
00E2        REM get part of the screen image
00F1        RUN getbuffer(1,buffer,section)
0113        REM write the image data to the compression program
0145        PUT #OutPipe,buffer
014F    NEXT section
015A
015B    CLOSE #OutPath,#OutPipe
0166    END
```

```
PROCEDURE GetWinAttr
0000    PARAM Window:BYTE
0007    PARAM typecode:INTEGER
000E    PARAM horiz,vert:INTEGER
0019    TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
003E    DIM regs:registers
0047    regs.a:=Window
0053    regs.b:=$93
005F    RUN syscall($8D,regs)
006D    IF LAND(regs.cc,1)=1 THEN
007F        ERROR regs.b
0087    ENDIF
0089    typecode:=regs.a
0094    IF typecode<5 THEN \REM not a graphics window
00B8        ERROR 183 \REM illegal window type
00D2    ENDIF
00D4    FOR i:=5 TO typecode
00E7        READ horiz,vert
00F0    NEXT i
00FB    END
00FD    DATA 640,192
0108    DATA 320,192
0113    DATA 640,192
011E    DATA 320,192
```

```
PROCEDURE MakPipe
0000    REM For a process with its standard output directed to
0035    REM a given path and its standard input coming from a pipe.
006F    PARAM Pgm:STRING
0076    PARAM InPath:BYTE \(* input for the new program
0099    PARAM OutPath:BYTE \REM Output for the new program
00BD    TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
00E2    DIM regs:registers
00EB    DIM tmp,OldIn,OldOut:BYTE
00FA
00FB    REM Fix standard output
0111    regs.a=1
011C    RUN syscall($82,regs) \REM dup standard output
0140    OldOut:=regs.a
014B    CLOSE #1
0150    regs.a:=OutPath
015C    RUN syscall($82,regs) \REM dup the output path into std out
018D
018E    REM Fix standard input
01A3    regs.a=0
01AE    RUN syscall($82,regs)
01BC    OldIn:=regs.a
01C7    CLOSE #0
01CC    OPEN #tmp,"/pipe":UPDATE
01DC
01DD    REM Now standard input and output are redirected as they
0214    REM should be. Fork the program
```



```

0233     regs.a:=0
023E     regs.b:=0
0249     regs.x:=ADDR(Pgm)
0257     regs.y:=0
0262     regs.u:=0
026D     RUN syscall($03,regs) \REM fork
0282
0283     REM now the process is running.
02A1     REM clean up after it
02B5     regs.a:=0
02C0     RUN syscall($82,regs) \REM dup the new stdin
02E2     InPath:=regs.a \REM save the pipe
02FD     CLOSE #0
0302     regs.a:=OldIn
030E     RUN syscall($82,regs) \REM dup to restore the old standard input
0344     CLOSE #OldIn
034A
034B     REM now restore the old standard output
0371     CLOSE #1
0376     regs.a:=OldOut
0382     RUN syscall($82,regs) \REM dup
0396     CLOSE #OldOut
039C     END

```

PROCEDURE GetBuffer

```

0000     PARAM Window:INTEGER
0007     PARAM buffer(7680):BYTE
0013     PARAM section:INTEGER
001A     TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
003F     DIM regs:registers
0048     DIM i,group:INTEGER
0053     DIM position:INTEGER
005A     DIM pointer:INTEGER
0061     BASE 0
0063
0064     RUN syscall($0C,regs) \REM get process id
0083     group:=regs.a
008E     position:=48*(section-1)
009C     RUN gfx2(Window,"get",group,1,0,position,639,48)
00C3
00C4     regs.a=1
00CF     regs.b=$84
00DB     regs.x=group*256+1
00EE     regs.y=1
00F9     RUN syscall($8E,regs) \REM map in "get" buffer
011D     IF LAND(regs.cc,1)<0 THEN \REM an error
013B         ERROR regs.b
0143     ENDIF
0145
0146     pointer:=regs.x \REM an optimization
0163     FOR i:=regs.y-1 TO 0 STEP -1
0180         buffer(i):=PEEK(pointer+i)
0191     NEXT i
019C
019D     regs.x=group*256+1
01B0     regs.y=0
01BB     RUN syscall($8E,regs) \REM unmap the "get" buffer
01E2     RUN gfx2("killbuff",group,1)
01FA     END

```

settled on 1K buffers, but that still leaves plenty of wasted space. I probably should have used even more memory for the buffers.

When I stitched the filter to the screen dump program, the result ran in about a minute and a quarter (on my test screen. It gives a different performance on different data). I wish it were faster, but I'm not offended by the performance any more.

Pipes

Unless you are comfortable with pipes, the MakPipe procedure may be the strangest part of the SaveImage program. The goal of the procedure is to save the current standard input and output paths and replace them with the patch we want the filter to have. When the paths are right, we fork the filter. The last part of the procedure gives the calling procedure a path number for the pipe and puts the standard paths back the way they were when MakPipe was called.

The I\$Dup system call gets a lot of use in MakPipe. You won't see it much except when a program is fooling with the standard paths. Dup gives a path a new path number, but it doesn't change the path in any way or touch the old path number. MakPipe uses it to save a path when it needs to borrow its path number.

MakPipe is mostly several repetitions of code like:

```

dup path 0 into x
close path 0
open /pipe

```

This saves the current path 0 (standard input) in x and replaces it with a pipe. The pipe file goes in path zero because OS-9 always uses the lowest free path number for a new path. ☺

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Taking Your Printer to the Limit

By William Barden, Jr.
Rainbow Contributing Editor

Back in the good old days of the Radio Shack Model I, a printer didn't have many bells and whistles. As a matter of fact, you were lucky if the printer did anything more than print listings in uppercase. Today, we have a different situation.

The DMP-130 I use with my CoCo is just *loaded* with all kinds of options — proportionally spaced characters, superscripting, boldface printing, and compressed printing, to name a few. As a matter of fact, the darn thing can even emulate an Epson/IBM printer! But using a printer to full advantage is tedious — there's a whole new printer language to learn and no tools to help. In this column we'll take a look at some of the things you can and can't do with your printer and how to learn that mysterious language.

Radio Shack Printers

First, a brief note about why Radio Shack printers are the way they are. They are very prolific creatures, spawning at a rate of about five per year. Unfortunately for the little critters, they die out after a brief life — usually only three years or so (although some have been known to live for 10 years or more). Their short life spans are due to the appearance of newer printers with more and more capabilities at lower and lower prices.

Early in the game, before IBM knew microcomputers were hot, Radio Shack established their own printer language, called a "control code sequence." A current name for this is "Tandy character set." At about the same time, Epson, an aggressive printer manufacturer, established its own standard set of characters and control codes.

Things went along smoothly until the IBM PC became a dominant force in the microcomputer market. IBM used an Epson printer as a standard IBM graphics printer, sticking their own label on the unit, and changing a few minor features.

When Tandy started stamping out IBM PC clones, they

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects or computers ranging from mainframes to micros.

had a problem. Their older printers used the Tandy character set and control codes, but not the IBM/Epson codes. Since most printer features are implemented in firmware in the printer, however, the solution was easy — simply make the two character sets/control code sequences switch-selectable. And that's what they did. Current Tandy printers will run either in IBM/Epson mode or in Tandy character mode by setting DIP switch settings on the printer, or even under program control.

In addition, many Tandy printers allow for either serial or parallel I/O. Serial I/O is used on the CoCos, as you know, while parallel I/O is used on Tandy MS-DOS (IBM-compatible) systems.

IBM's vs. Tandy's Character Set

The two character sets, IBM and Tandy, are mutually exclusive, having very few similarities in the control codes. Certainly, there's no problem in printing plain text in either set, but we'd like to do more than that. The biggest difference between the two sets is in graphics mode. Tandy has historically used seven dots per graphics column, while IBM/Epson uses eight dots per graphics column. Both accomplish the same thing, but it's a little harder to work with numbers that are not powers of two in graphics. For example, if you wanted to write a screen dump program for the Hi-Res 640-by-192 mode on the CoCo 3, you'd have 24 graphics columns vertically in IBM/Epson mode, but $192/7 = 27\frac{3}{7}$ columns in Tandy mode. CoCo software, however, is geared more to the Tandy character set. Also, the Tandy character set/control code sequence affords a few more niceties. For that reason, we'll stick with the Tandy character set in this column.

The printer we'll use for examples will be the Tandy DMP-130. This is an efficient, inexpensive dot matrix printer that I'm sure many of you have. If you don't have a DMP-130, you're still in luck, because most of the control code sequences used for illustration here will be the same for your printer — there's a great deal of similarity between the capabilities of the printers and their use of the Tandy control codes.

Fonts

Current Tandy printers have three basic fonts, which are

the designs of the printable characters: standard, correspondence and proportionally spaced. Figure 1 shows these three basic fonts as printed with a DMP-130.

```
This is a sample of standard characters
This is a sample of correspondence characters
This is a sample of proportional characters
```

Figure 1

As you can see, the quality of the fonts differs — the lowest quality is the standard font, better is the correspondence font, and the highest quality font is the proportional font. The correspondence and proportional fonts approach what would be printed on a daisy wheel printer, as a matter of fact.

On most Tandy printers, the higher-quality fonts take longer to print. For informal printing, then, it makes sense to use the standard font. For letter writing, the correspondence font is nice. For the best quality, say, manuscripts for THE RAINBOW, the proportional font is good.

There is one problem with using the proportional font, however: It is sometimes difficult to get a clean right margin. The term *proportional* simply means that each letter is allocated a different width. Notice in Figure 1 that the first two fonts are spaced at 10 characters per inch (the "of" ends at the same place), while the proportional font compresses the text more. This text compression occurs because letters such as 'i' are less than 1/10th-inch wide. The overall appearance of the type is very pleasing, however.

How do you get a justified right margin? Some word processing programs will provide a justified text mode that supports your printer. Often, however, you're left to write a program that counts the widths of individual characters and then inserts thin slivers of space in between words and characters to provide a clean right edge. More on that later.

The Basic Font Control Code Sequence

The corresponding listing to produce the printout in Figure 1 is shown here:

```
100 PRINT#-2, CHR$(27);CHR$(19);
110 PRINT#-2, "This is a sample of standard
    characters"
120 PRINT#-2, CHR$(27);CHR$(18);
130 PRINT#-2, "This is a sample of correspond-
    ence characters"
140 PRINT#-2, CHR$(27);CHR$(17);
150 PRINT#-2, "This is a sample of proportional
    characters"
```

The PRINT#-2 portion is the standard way in Extended Color BASIC to address the system printer. A normal text line is printed by enclosing the text in quotes. The CHR\$ sequences need some explanation. Each CHR\$ function creates one character; two CHR\$ functions create two characters. The character function *could* be used to print any text character:

```
100 PRINT#-2, CHR$(65);CHR$(66)
```

This line prints AB, for example. In most cases, though, CHR\$ is used to print only those characters that are less than 32 decimal, which are called "control codes" and are usually not entered from the keyboard. The control code decimal 27 is called an "escape" control code and was used on old teletypewriting equipment to signal an interrupt. An escape code often precedes a special control code action, and control code sequences are also called "escape sequences." In this case, the escape sequences are the following:

```
27, 19 Set standard characters
27, 18 Set correspondence characters
27, 17 Set proportional characters
```

Once the font is set, it remains in force until a new control code sequence sets another font. You could set a new font at any time, however, just by inserting the control code characters at the proper point in the PRINT#-2 statement.

```
100 PRINT#-2, "Standard here, but "; CHR$(27);
    CHR$(18); "correspondence here"
```

Another way to do this is with *concatenated* strings:

```
100 PRINT#-2, "Standard here, but " + CHR$(27) +
    CHR$(18) + "correspondence here"
```

Spacing

For historical reasons, standard spacing is 10 characters per inch horizontally for non-proportional fonts. This makes each character 1/10th-inch wide, the same width as typewriter characters (remember typewriters?). Radio Shack printers, however, allow several variations on this standard width, as shown in Figure 2.

```
This is a sample of 10-pitch spacing
This is a sample of 12-pitch spacing
This is a sample of condensed (17 cpi)
This is elongated text
```

Figure 2

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This is a sample of 10-pitch spacing
This is a sample of 12-pitch spacing
This is a sample of condensed (17 cpi)
This is elongated text

Figure 3

This is an example of microfont mode.
Note that the line spacing is 1/2 normal.

Figure 4

The top line prints at 10 characters per inch, the standard spacing. The next line is set by the control code sequence PRINT#-2, CHR\$(27); CHR\$(29) and prints at 12 characters per inch. The next line is "condensed," a Radio Shack term for 17 characters per inch. This spacing is about the smallest possible for characters on most printers. It allows 136 columns to be put in eight inches horizontally, a boon for printing spreadsheets and other listings. Essentially, it reduces the large computer listing format down to a manageable 8½-by-11 inch paper size. The condensed text is set by PRINT#-2, CHR\$(27); CHR\$(20). The final text is "elongated." In this mode, two horizontal dots are printed for every single dot, making the characters twice as wide as they would normally be. Elongated characters can be printed in 10-pitch, 12-pitch and 17-pitch mode. Elongation is set by PRINT#-2, CHR\$(27); CHR\$(14) and reset by PRINT#-2, CHR\$(27); CHR\$(15).

The bottom line, therefore, is that you can have 10, 12, 17, 5, 6 or 8.5 characters per inch, depending upon the font and spacing set.

Italics and Microfont

Earlier Radio Shack printers do not have an italics or microfont capability. For example, my DMP-2100, a 5-year-old printer, has many options, but not as many as the DMP-130. The DMP-130 and several others have the ability to italicize text for most type styles, as shown in Figure 3. The italics mode is set by PRINT#-2, CHR\$(27); CHR\$(66); CHR\$(1) and reset by PRINT#-2, CHR\$(27); CHR\$(66); CHR\$(0).

The microfont mode produces text that is half the height of regular text; it is printed on the top half of the line, as shown in Figure 4. Microfont mode is set by CHR\$(27); CHR\$(77). Microfont mode is ended by selecting another mode.

Other Character-Related Actions

In addition to italics and microfont, most newer printers have the ability to superscript and subscript. Again, this is usually a control code sequence (in the DMP-130, it is 27, 83, 0 to start superscripting; 27, 83, 1 to start subscripting; and 27, 88 to end either superscripting or subscripting).

Almost all Radio Shack printers have the ability to perform bold printing, using a 27, 31 (start) and 27, 32 (end) control code sequence. Many printers print boldface by overprinting the characters a second time, resulting in the print speed being halved.

Underlining is also a feature found on all printers except for the most ancient. This mode is set by the control code 15 and canceled by the control code 14.

In addition to standard ASCII characters, most newer printers have an *extended character set*. In IBM/Epson mode, this extended character set more or less matches what you see in the extended graphics mode on the screen — foreign characters, shading characters and line segments. In Tandy mode, the same types of characters are present, but the codes are different.

On a typical modern dot matrix printer, therefore, you have about five different type fonts, six types of character spacing, superscripting and subscripting, bold printing, and underlining. All of this for about \$250 or less!

Line Spacing

Printers historically have printed at six lines per inch, about the vertical spacing of typewriters. However, all newer printers have the ability to print at six lines per inch, eight lines per inch, and incremental amounts in between. This is a useful feature that allows you to create a variety of line spacing, or "leading," as it is called in the typesetting trade.

The DMP-130, for example, has control code sequences that allow you to space vertically in increments of 1/12-inch reverse, 1/6-inch reverse, 1/216-inch forward, 1/144-inch forward, 1/72-inch forward, 1/12-inch forward, 1/8-inch forward and 1/6-inch forward, allowing you to get practically anywhere on the page vertically, with a precision of 0.0046 inch! Figure 5 shows the effect of different spacings on text.

Line spacings of six, eight, and 12 lines per inch are used in the figure. Reverse line spacing also could have been used, or a new line of a smaller increment could have been used, but that doesn't make too much sense for text.

Forms Control

The standard "page" for printing is 8½-by-11 inches. The

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 Print Speed: 100 characters per second, 31 lines per minute
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Figure 5

Figure 6

11-inch length translates to 66 lines per page when a standard line spacing of six lines per inch is used. However, newer Radio Shack printers allow you to specify any page length from $\frac{1}{6}$ inch (a rather short page) to about 44 inches by using the control code sequence 27, 52, n , where n is the length in $\frac{1}{6}$ -inch units. Although most word processing packages also allow you to keep track of the page length and automatically do a new page by a series of line feeds, the built-in page length is something you get for free and can be useful in programs in which the special "form feed" control character (decimal) 12 is used.

Column Positioning

Depending on the font and pitch selected, the firmware of the printer keeps track of the current "dot column" as it is printing. The DMP-130, for example, prints a 9-by-9 matrix of dots in the standard font in 10 pitch with each character occupying 12-dot columns (there's some blank space between characters). Since 80 characters can be printed per page, the total number of dot columns in this mode is 80 times 12, or 960 dot columns. In 12 pitch, the number of dot columns is increased by $12/10$ and becomes $1.2 * 960 = 1,152$. For condensed and correspondence modes, the number of dot columns is increased still further.

On most newer Radio Shack printers, the print head can be positioned to any dot column or at least every other dot

column by two methods: moving the print head incrementally by a small number of dot positions or moving the print head to a specific dot column on the current print line.

You could, for example, move the print head to dot column 400 out of 0 through 479 on the DMP-130 by using the control code sequence `PRINT#-2, CHR$(27); CHR$(16); CHR$(1); CHR$(144);`.

The first two characters here specify that this is a print head positioning action. The 1 and 144 are the two bytes that define the dot column. The first byte must be multiplied by 256 — the final dot column is defined by $1 * 256 + 144 = 400$.

To see how this works, consider the following code, which prints an 'X' at dot columns 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233 and 377 (this is a *Fibonacci series*, in which the next position is determined by adding the previous two numbers — 8 and 13 produce 21, for example):

```

100 N1 = 1
110 N2 = 0
120 N3 = N1 + N2
130 PRINT#-2, CHR$(27); CHR$(16); CHR$(INT
    (N3/256)); CHR$(N3 - INT(N3/256) * 256);
    "X";
140 N1 = N2
150 N2 = N3
160 IF N2 <> 377 THEN GOTO 120
170 PRINT#-2

```

The printing for this code is shown in Figure 6.

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in the good old days of the Radio Shack Model I, a printer didn't have many bells and whistles. As a matter of fact, you were lucky if the printer did anything more than print listings in upper case. Today, we have a different situation. The DMP-130 I use on my CoCo is just loaded with all kinds of options - proportional-spaced characters, superscripting, bold-face printing, and compressed printing, to name a few. As a matter of fact, the darn thing can even emulate an Epson/IBM printer! Using a printer to full advantage is tedious - there's a whole

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Figure 7

Although the DMP-130 does not have incremental dot positioning, other printers have a "proportional spacing" control sequence, in which you can move the print head tiny amounts, usually 0 to 9 dot columns (`CHR$(27); CHR$(n)`, where n is 0 to 9). This allows you to move relative to the current print head position. This sequence is handy for doing justification of text in proportional spacing mode. The proportional font prints characters in varying widths. To get a clean right edge (a *justified* edge), these steps must be followed:

- Find the word break
- Put everything after the word break on the next line
- Look up the widths of every character on the current text line and arrive at a grand total
- Find the difference between this grand total and the dot column width of the line
- Insert slivers of space using the proportional spacing control codes between random words to make up the difference

A sample of justification is shown in Figure 7, on a printout from a DMP-2100. The same justification is possible on printers such as the DMP-130, but the computations must be in absolute dot column values from the left margin. The DMP-130 also has a control code sequence of `CHR$(8); CHR$(n)`, where n is a number from 0 to 255, and backspaces from 0 to 255 dot columns.

You might ask yourself why all software packages don't provide automatic justification on printing. The answer lies in those five printers per year and the huge number of other printers available. There are so many printers in use and so little standardization that it's hard to provide printer "drivers" (software subroutines) for every printer on a system, even the average CoCo system. As a result, many of the capabilities of the printers in use are not implemented. It's a shame, too, because the quality of the printing could be much better.

Graphics Modes

As printers became controlled by microprocessors and

print actions by firmware or by software inside the printers, it became easy to add graphics printing. After all, what's the difference in printing a dot matrix representing an alphabetic character and printing those same dots to represent graphics? High resolution graphics printing actually preceded high resolution screens in microcomputers, and current printers can more than match the CoCo 3's 640-by-192 Hi-Res screen.

In graphics printing, the same action is taken to print either seven dots (Tandy) or eight dots (IBM/Epson) per vertical column. Newer printers also print with nine-pin heads and 24-pin heads, but in Tandy mode, most graphics printing is done in seven-dot columns.

In normal text printing, "white space" is inserted between columns, as shown in Figure 8. However, in graphics mode, no white space is required, because the graphics dots must be contiguous — the next dot column must start one dot away vertically from the last dot column. Because of this, a smaller line spacing is used in graphics mode, $7/72$ -inch in the DMP-130 or similar spacing in other printers.

The number of dot columns per inch horizontally is usually

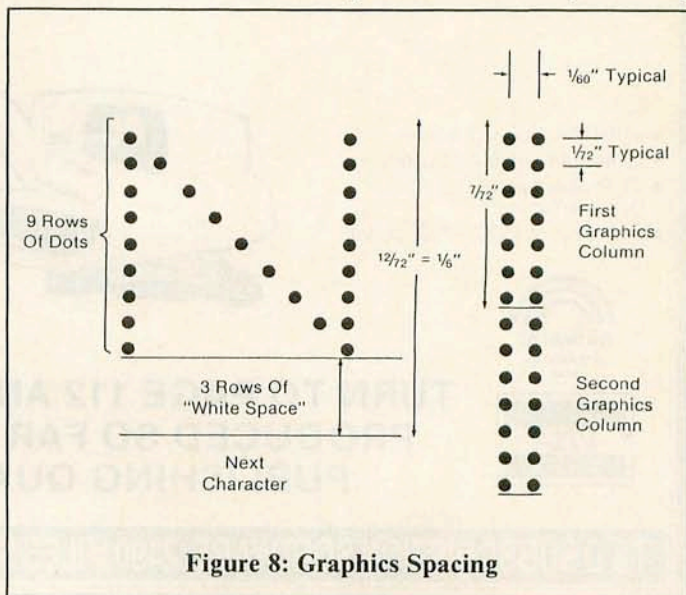


Figure 8: Graphics Spacing

on the order of 60, although some Radio Shack printers allow even greater resolution — up to hundreds of dots per inch. The DMP-130, for example, prints graphics dot columns at 60 per inch, making the total number of dot columns across the page 480. In a 10-inch vertical print area, there are 104 dot columns or 728 dots. This makes the total “resolution” of a printed page about 480 by 728 dots, a total of 349,000.

The aspect ratio of 480 to 728, however, doesn't really match the CoCo 3 screen aspect ratio of 4 to 3. Therefore, it's difficult to “print the screen” in screen dumps in graphics mode unless some compensation is made. One way to do a screen dump is to rotate the dump 90 degrees to print the horizontal portion of the screen vertically on the paper. The aspect ratio now becomes $192/60 = 3.2$ to $640 / 72 = 8.8$ inches, or 8.8 to 3.2. Expanding the vertical screen dimension (printed horizontally) by printing two dots for every screen dot makes the aspect ratio 8.8 to 6.4 inches very close to the screen's 4:3 aspect ratio. CoCo screen dumps have been described in this column in the past and are easy to do.

What is more difficult to accomplish is doing anything significant with printer graphics without a great deal of trouble. CoCo Extended Color BASIC and OS-9 BASIC09 have quite good graphics commands that allow you to draw and color lines, boxes, circles, windows and complex shapes. Printer “language,” however, has no such capability — the best you can do is draw a vertical column of dots. This means that unless screen dumps are done, graphics on printers must be done by laboriously translating figures into a series of vertical dot columns. This is a tedious operation, to say the least. Here's a sample:

Suppose we have the shapes and initials shown in Figure 9 and want to print them on our system printer as a logo. First, an overlay representing the printer resolution must be

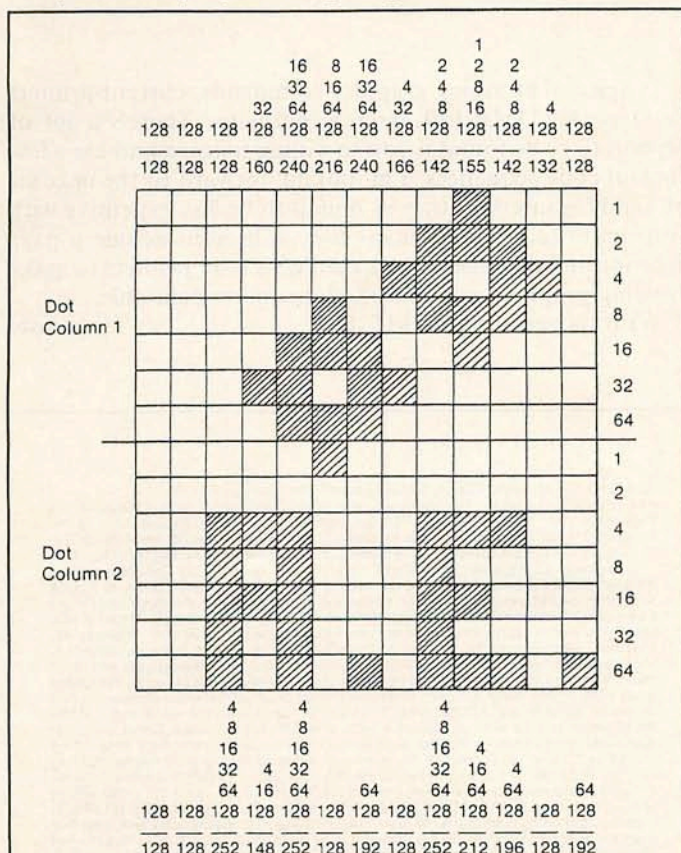


Figure 9: Typical Graphics Translation

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superimposed on the shape. Next, the lines across the shape must be converted into dot columns. Each dot column is then encoded into a numeric value. In Tandy graphics mode, the seven dots in a dot column represent values of 1, 2, 4, 8, 16, 32, 64, and 128, moving from top to bottom. The final value for each dot column is calculated by adding the individual dot values together and then adding 128. (The 128 value sets the most significant bit of the byte, marking it as a graphics value when sent to the printer.)

To print the graphics shape, graphics mode is set by a PRINT#-2, CHR\$(18). Each line of dot columns is then printed by sending the individual dot column values. At the end of each line, a PRINT#-2 moves to the next line, spacing the 7/72-inch graphics line spacing. The complete program is shown below.

```

100 DATA 128, 128, 128, 160, 240, 216, 240, 166
110 DATA 142, 155, 142, 132, 128
120 DATA 128, 128, 252, 148, 252, 128, 192, 128
130 DATA 252, 212, 196, 128, 192
140 PRINT#-2, CHR$(18) ' set graphics mode
150 FOR I = 1 TO 13 ' print first row
160 READ A
170 PRINT#-2, CHR$(A);
180 NEXT I
190 PRINT#-2 ' line feed
200 FOR I = 1 TO 13 ' print second row
210 READ A
220 PRINT#-2, CHR$(A);
230 NEXT I
240 PRINT#-2 ' line feed
    
```

In spite of complex graphics commands, current printers such as the DMP-130 are real bargains. There's a lot of capability to be found if you're willing to learn and use a few control code sequences. I'm looking forward to the next set of Tandy printers — they're bound to be less expensive with even more features. Perhaps they will even include a page description language as packaged with laser printers to make drawing graphics and defining fonts more palatable.

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KISSable OS-9

Putting Data Structures on the Drawing Board

By Dale L. Puckett
Rainbow Contributing Editor

KISSDraw takes a great leap forward this month as we show you how to save your artwork and load it back into memory. We also increase the speed of the program dramatically by taking a different approach to output and finish the KISSDrawArc routine. We tinkered with the design of the HandleMenu procedure, and the file menu now works like the menus on a Macintosh. KISSDraw's overall structure remains basically the same, so you won't be starting over from scratch.

From Easy to Easy

The first goal we wanted to accomplish when we started KISSDraw was to show you how easy it is to do really amazing graphics programming with the primitives built into OS-9 — especially when you access them through BASIC09. Our next objective was to introduce the general concept of event- and object-oriented programming. Last month, we introduced the main event loop. This month we hope to concentrate on objects.

Down the road we hope to experiment with OS-9's SS.MsSig GetStat

call to see if we can come up with a way for the GetKISSMouse routine to run in the background continuously, sending a signal to KISSDraw — or any other program you install it in — each time there is a mouse event. If we do that, the main program will be able to go about its business until it is summoned by the mouse. But that's another column.

We hadn't even finished last month's column when we ran into a brick wall. We were in a hurry and wanted to publish a routine that would let you save your drawings in a disk file. From the beginning, we had planned to redirect the output of KISSDraw's DoEvent procedure to a tee filter. The output of the tee would go to a disk file and the screen at the same time. It was a great idea! But, you can't redirect the run statements in a BASIC09 program.

On several occasions I wrote BASIC09 programs as filters and ran them using RunB from the OS-9 command line, so I thought I could attack the problem by using BASIC09's Shell statement to run an OS-9 command that was actually a module of BASIC09 I-code. It wasn't meant to happen. It would take an act of Congress and quite a programming feat to put together the string required to pass the complex data structure KISSDraw uses to RunB. Once again we had proven the old programmers adage: prior planning could have prevented poor performance.

Managing Your Development

As your programs grow larger, you'll quickly discover that you need to get organized. During the past month we reached that point with KISSDraw. The

length of the source code has now reached the point where KISSDraw will no longer fit when BASIC09 is running with 32K of workspace. However, because of BASIC09's modular design and its ability to pack procedures into intermediate code modules, we can continue our project.

The solution is to pick the modules you feel are stable at this point in your program's development cycle and pack them into BASIC09 I-code modules that can reside anywhere in the 512K bytes available in your Color Computer 3 — but outside your BASIC09 workspace.

When you do this, you'll free plenty of memory. For example, KISSdMenu presently needs 3,885 bytes in BASIC09's workspace. When it's packed, it only needs 761 bytes of memory. The source for WhichTool is 1,914 bytes long. Its packed binary code is only 864 bytes long. And KISSDrawArc took 3,192 bytes of source code. It packs down to 1,585 bytes.

Next month, we will merge packed modules of SetUpMouse, WhichTool, DoEvent, KISSdMenu, KISSFreehand and the individual procedures that draw bars, boxes, circles, ellipses and lines. They all fit in a file less than 8K long. It's important to notice we planned it that way. Why?

A Typical Problem

Let's study a typical troubling scenario that many people are running into these days, if the questions on RAINBOW's Delphi OS-9 On-Line Forum are an indicator. The symptoms are "Error 32 — Memory Full" and "Error 43 — Unknown Procedure" messages. The

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide and co-author, with Peter Dibble, of The Complete Rainbow Guide to OS-9, is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.

reason they are receiving these messages is complex, but it's easy to understand when you analyze the problem.

Even though you have 512K bytes of

block of memory into your 64K BASIC09 workspace.

You're OK so far. You have used exactly 65,536 bytes or eight blocks of

another 8K block of memory left in BASIC09's process area, and you receive the error message.

The answer is to merge `gfx2`, `SysCall` and `InKey` into one file. Since `gfx2` is only 2,250 bytes long, you have plenty of space left in its 8K block. In fact, we'll probably merge several of *KISSDraw*'s general modules into this file once they are finalized. Since almost any BASIC09 graphics program we write uses `gfx2`, we will have access to quite a few of the *KISSDraw* primitives at no extra memory cost.

This all means if you are going to run a file containing up to 8K of packed I-code modules from within your BASIC09 programs, you must not ask for more than 24K of memory. An 8K block for any module in your own file, plus an 8K block for `gfx2` and any modules contained in its file and the 24K BASIC09 workspace add up to 40K. That leaves 24K for BASIC09's program code and that's exactly what it uses.

If your file of packed modules contains between 8,193 and 16,383 bytes, you will use 16K of memory when you

"Even though you have 512K bytes of memory available on your Color Computer 3, each process you run can use only 64K of memory for its program code and its data."

memory available on your Color Computer 3, each process you run can use only 64K of memory for its program code and its data. When BASIC09 is running, it is a process. Its program code uses 23,244 bytes. However, because of the way OS-9 Level II memory management works, it takes a full three blocks or 24,576 bytes. If you run BASIC09 with 32K bytes of data memory, you have used a total of 56,012 bytes or seven blocks of memory. Of the 65,536 bytes or eight blocks available, you have 8,192 bytes or one block left in BASIC09's 64K process block.

Let's assume you are a beginning BASIC09 programmer and have not yet mastered OS-9. In that case you probably haven't gotten around to merging the `InKey` and `SysCall` modules into your `gfx2` file. Planning to write a large program, you ask for 32K of memory when you start BASIC09. You decide to start with a simple routine, but that routine just happens to use `InKey` and `gfx2`. You look at the listing time and time again. It has to be right. In fact, it is right. But after listing your procedure again, you type `RUN` for the 16th time and get the same error messages again. What happened?

When your BASIC09 procedure encountered the line `RUN InKey(Char)`, it did not find a procedure by that name in your BASIC09 workspace since `InKey` is an I-code module. OS-9 then looked in its module directory to see if a module named `InKey` existed. It didn't, so it looked for a file by that name in your current execution directory, loaded it and then linked to the module `InKey`. When OS-9 loaded the 94-byte `InKey` module it stored it in an 8K block. When your BASIC09 program ran `InKey`, OS-9 switched the entire 8K

memory — all that is allotted to a process. But the next line of your program uses the `gfx2` procedure to clear your Color Computer's screen. BASIC09 retraces its steps and attempts to switch the 8K block of memory that contains the 2,250-byte `gfx2` module. It quickly discovers that there's not

```
TYPE rodent=Vld,Act,ToTm:BYTE; X1:INTEGER; TTto:BYTE; TSSt:
INTEGER; CBSA,CBSB,CCtA,CCtB,TTSA,TTSB,TLsa,TLsB:BYTE
; X2,BDX,BDY:INTEGER; Stat,Res:BYTE; AcX,AcY,WRX,WRy:
INTEGER
TYPE stats=IsEvent,InWindow,InToolBox,InMenuBar,line,box,circle
,ellipse,bar,arc,fill,text,freehand,RecordOn:BOOLEAN
TYPE cursor=OutPut,Scale,ScreenType,NoCur,arrow,pencil,cross
,hourglass,NoIcon,TextBar,Scross,Icon,IconBuff,pattern
,horzline,vertline,slantright,slantleft,dots:BYTE
TYPE codes=DArc,DBar,DBox,DCircle,DEllipse,DLine,DPoint,DFill
,DSetPtr,DPutCur,DSetCur,DLogic,DPattern:INTEGER
TYPE object=DCode,HorP,VerP:INTEGER
TYPE orgin=DPSCode,HanX,HanY:INTEGER
TYPE packet=mouse:rodent; status:stats; pointer:cursor; Code
:codes; Pen:object; Handle:orgin
```

Figure 1: Type Statements

Listing 1: KISSDrawPut

```
PROCEDURE KISSDrawPut
  ***      (* Drawing program For the Color Computer III
```

Insert type statements from Figure 1

```
01CE      TYPE Drawing=Loc:orgin; tool:object
01E3
01E4      DIM Event:packet
```


load it. You will then only be able to ask for 16K of BASIC09 workspace. Let's add it up again:

$$16K+8K+16K+24K=64K.$$

Ponder what would have happened if we had stored the *KISSDraw* modules listed above in individual files in our CMDS directory. They would have used 88K of memory when they were loaded. That's not a problem. But each time we called a new one from our BASIC09 program we would have switched another 8K block of memory into our 64K workspace. After the first two or three, we would be out of memory within BASIC09's workspace.

"We revamped the HandleMenu procedure, attempting to emulate the way a Macintosh menu works. The patient lived."

To merge gfx2, InKey and SysCall, you can run the following lines from the OS-9 prompt.

```
chd /dd/cmds
rename gfx2 gfx2.original
merge gfx2.original InKey
SysCall > gfx2
attr gfx2 e pe
```

If you are going to be running a lot of packed BASIC09 programs from the OS-9 command line rather than from within BASIC09 itself, you may also want to merge InKey and SysCall into your RunB file. This will cover you when you run a packed program from the OS-9 command line that does not use the gfx2 module but does use InKey and SysCall. Just change gfx2 to RunB in the command lines above.

The bottom line: Remember that the OS-9 memory management scheme switches 8K of memory at a time into the workspace used by a process, no matter how short the module in that 8K block, and always account for that 8K of memory.

Type Changes This Month

If you look closely at the TYPE statements in our new version of *KISSDraw*, you'll notice several changes. After we

```

01ED DIM MaxObjects,ObjNum:INTEGER
01F8 DIM PixFile:BYTE
01FF DIM Picture(255):Drawing
020D DIM char:STRING[1]
0219
021A MaxObjects:=255
0221 FOR ObjNum:=1 TO MaxObjects
0232   Picture(ObjNum).Loc.DPSCode:=0
0243   Picture(ObjNum).Loc.HanX:=0
0254   Picture(ObjNum).Loc.HanY:=0
0265   Picture(ObjNum).tool.DCode:=0
0276   Picture(ObjNum).tool.HorP:=0
0287   Picture(ObjNum).tool.VerP:=0
0298 NEXT ObjNum
02A3 ObjNum:=1
02AA
02AB char:=""
02B2 Event.status.RecordOn:=FALSE
02BF Event.Code.DSetCur:=$1B39
02CE Event.Code.DPutCur:=$1B4E
02DD Event.Code.DSetPtr:=$1B40
02EC Event.Handle.DPSCode:=Event.Code.DSetPtr
0301 Event.Code.DBox:=$1B48
0310 Event.Code.DBar:=$1B4A
031F Event.Code.DCircle:=$1B50
032E Event.Code.DEllipse:=$1B51
033D Event.Code.DFill:=$1B4F
034C Event.Code.DLine:=$1B44
035B Event.Code.DArc:=$1B52
036A Event.pointer.OutPut:=1
0378 Event.status.IsEvent:=FALSE
0385 Event.status.line:=FALSE
0392 Event.status.box:=FALSE
039F Event.status.circle:=FALSE
03AC Event.status.ellipse:=FALSE
03B9 Event.status.bar:=FALSE
03C6 Event.status.arc:=FALSE
03D3 Event.status.fill:=FALSE
03E0 Event.status.text:=FALSE
03ED Event.status.freehand:=FALSE
03FA
03FB Event.pointer.NoCur=0
0409 Event.pointer.arrow=1
0417 Event.pointer.pencil=2
0425 Event.pointer.cross=3
0433 Event.pointer.hourglass=4
0441 Event.pointer.NoIcon=5
044F Event.pointer.TextBar=6
045D Event.pointer.Scroll=7
046B Event.pointer.IconBuff=255
0479
047A (* First we need to start with a clear screen
04A7 (* and draw the menu
04BB
04BC RUN gfx2("clear")
04C9 RUN KISSdMenu(Event)
04D3
04D4 (* We must bring the high resolution mouse on line
0506 (* and find out where it is pointing
052A
052B RUN setupmouse
052F Event.Pen.DCode:=Event.Code.DSetCur
0544 Event.Pen.HorP:=INT(256*Event.pointer.IconBuff)+Event.pointer.arrow
056A Event.Pen.VerP:=0
0578 PUT #1,Event.Pen
0585
0586 LOOP \REM Main Event Loop
059A
059B EXITIF char<>"" THEN
05A7 ENDEXIT
05AB
05AC RUN inkey(char)
05B6 RUN getKISSmouse(Event)
05C0
05C1 (* Has there been an event
05DC (* Is Button Down
05ED
05EE IF Event.status.IsEvent THEN
05FD   IF Event.status.InToolBox THEN
060C     RUN WhichTool(Event)
0616     Event.Pen.DCode:=Event.Code.DSetCur

```



```

062B      Event.Pen.HorP:=256*Event.pointer.IconBuff+Event.pointer.pencil
064E      Event.Pen.VerP:=0
065C      PUT #1,Event.Pen
0669      RUN DoEvent(Event)
0673      REM Record Data Structure Picture here is Record Flag is ON.
06AE      IF Event.status.RecordOn THEN
06BD          IF ObjNum<=MaxObjects THEN
06CA              Picture(ObjNum).Loc:=Event.Handle
06DC              Picture(ObjNum).tool:=Event.Pen
06EE              ObjNum:=ObjNum+1
06F9          ENDIF
06FB      ENDIF
06FD
06FE      Event.Pen.DCode:=Event.Code.DSetCur
0713      Event.Pen.HorP:=256*Event.pointer.IconBuff+Event.pointer.arrow
0736      Event.Pen.VerP:=0
0744      PUT #1,Event.Pen
0751      ENDIF
0753
0754      IF Event.status.InMenuBar THEN
0763          RUN HandleMenu(Event,Picture)
0772      ENDIF
0774      ENDIF
0776      ENDLOOP
077A
077B      (* Turn Graphics Cursor off before leaving program
07AD      Event.Pen.DCode:=Event.Code.DSetCur
07C2      Event.Pen.HorP:=Event.pointer.NoCur
07D7      Event.Pen.VerP:=Event.pointer.NoCur
07EC      PUT #1,Event.Pen
07F9      END
07FB

```

Listing 2: GetKISSMouse

```

PROCEDURE GetKISSMouse
0000      (* Reads the present location of the mouse and
002E      (* returns the status of the button.

```

Insert type statements from Figure 1

```

01F3      PARAM Event:packet
01FC
01FD      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
0222
0223      DIM RegisterSet:registers
022C      DIM callcode:BYTE
0233
0234      RegisterSet.a:=0
023F      RegisterSet.b:=$89
024B      RegisterSet.x:=ADDR(Event.mouse)
025C      RegisterSet.y:=1
0267      callcode:=$8D
026F
0270      RUN syscall(callcode,RegisterSet)
027F
0280      IF Event.mouse.CBSA<>0 THEN
0292          Event.status.IsEvent:=TRUE
029F      ELSE
02A3          Event.status.IsEvent:=FALSE
02B0      ENDIF

```

made them in the main procedure, we copied them into all of the other procedures using *DynaStar*, the screen editor from FHL. This saved us several hours of typing with the BASIC09 editor.

We'll point out some of the major features here. The data type *rodent*, which holds a packet of information from the mouse, wasn't changed. In the data type *stats*, we changed the name of the *Event* to *IsEvent*. This lets us change the name of our packet from *ButtonEvent* to *Event*, saving many keystrokes and making more sense. We also added a field named *RecordOn* here and removed all of the fields that define fill patterns.

The data type *cursor* grew. We added a field that can be used to hold an *OutPut* path if we need it later. We also added a field named *Scale* and another named *ScreenType*. We'll need this when we get around to adding a *GetStat* call to determine the screen type. An 80-column screen type will be assigned a scale of one while a 40-column screen will have a scale value of two. After we add these routines, we will edit the *GetKISSMouse* procedure so the horizontal pixel position is always the position returned by the mouse divided by the scale. This means if we run *KISSDraw* in a 40-column window, it will handle it automatically. Presently, you must only run it in an 80-column window.

We moved the pattern fields into the data type *cursor*, which is made up of *BYTE* fields. This lets us store the numerical value for each type of pattern in a variable named *pointer*. Instead of typing a group number — which doesn't mean much to human beings — to set a pattern, we can now type a field name. It takes a few more keystrokes, but it makes your code almost intuitively obvious to anyone who reads it.

Additional data types added this

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month include object, origin (which we discussed earlier) and codes. Data of the TYPE codes is used to store the actual numerical codes that define the various objects we want to draw. We can then use symbolic names when we define our objects instead of hexadecimal numbers that don't mean anything to anyone.

An example would help here. First, we'll go ahead and show you the DIM statement for the new data packet and then we'll initialize one of the tools:

```
TYPE packet=mouse:rodent;
      status:stats;
      pointer:cursor;
      code:codes; Pen:
      object; Handle:
      origin
DIM Event:packet
Event.Pen.DCode:=Event.Code.
      .DBar
```

In addition to the data types there are a few other things worth spotlighting in this month's listing. Immediately after the DIM statements, you'll find a FOR-NEXT loop that initializes the entire array picture to a value of 0 and sets the ObjNum to 1.

In the next section we initialize many of the variables used by *KISSDraw*. It's here that we set the value in each of the drawing code fields. The next major change to *KISSDraw*'s main procedure occurs in the main event loop. After we run the procedure DoEvent (next month) to put an object on the screen, we check to see if the flag, Event.Status.RecordOn, is true. If it is, we check to make sure the array Picture is not full. If there is still room in Picture, we store the object that we just put on the screen in DoEvent in the array. Notice that Event.Handle and Event.Pen together put one drawing in the array. After we put them there, we increment the counter ObjNum.

In the SavePix routine we did not worry about the handling of filenames. We simply opened a file named Test-Save for Update. To make sure it was there, we created a dummy file with that name that contained one character. Eventually, we will have to deal with files that already exist and add a routine that prompts you for a filename in an overlay window.

We added the PreviewPix procedure to the menu items to give you a way to look at the images you have stored in a picture before you send them to a file. We used an overlay window and reversed the screen colors in this routine,

```
02B2
02B3 IF Event.mouse.AcY<10 THEN
02C5 Event.status.InMenuBar:=TRUE
02D2 ELSE
02D6 Event.status.InMenuBar:=FALSE
02E3 ENDIF
02E5
02E6 IF Event.mouse.AcX<40 THEN
02F8 Event.status.InToolBox:=TRUE
0305 ELSE
0309 Event.status.InToolBox:=FALSE
0316 ENDIF
0318
0319 IF NOT(Event.status.InMenuBar) AND NOT(Event.status.InToolBox
      ) THEN
0334 Event.status.InWindow:=TRUE
0341 ELSE
0345 Event.status.InWindow:=FALSE
0352 ENDIF
0354
0355 REM Put out the Cursor
036A Event.Pen.DCode:=Event.Code.DPutCur
037F Event.Pen.HorP:=Event.mouse.AcX \Event.Pen.VerP:=Event.mouse.AcY
03A9 PUT #1,Event.Pen
03B6 END
```

Listing 3: SavePix

```
PROCEDURE SavePix
0000 (* This procedure will record the data structure containing
003B (* your picture.
```

Insert type statements from Figure 1

```
01EB
01EC TYPE drawing=loc:origin; tool:object
0201 PARAM Event:packet; Picture(20):drawing
0217
0218 DIM PixFile:BYTE
021F
0220 OPEN #PixFile,"TestSave":UPDATE
0233 PUT #PixFile,Picture
023D CLOSE #PixFile
0243 END
0245
```

Listing 4: LoadPix

```
PROCEDURE LoadPix
0000 (* This procedure will put a picture you have recorded earlier
003E (* on your Color Computer III screen. Eventually, it will also
007D (* load the picture into your data structure so you can change it.
```

Insert type statements from Figure 1

```
0260 TYPE drawing=loc:origin; tool:object
0275 PARAM Event:packet; Picture(20):drawing
028B
028C DIM PixFile:BYTE
0293 DIM NumDrawing:INTEGER
029A
029B OPEN #PixFile,"TestSave":READ
02AE GET #PixFile,Picture
02B8 PUT #1,Picture
02C1 CLOSE #PixFile
02C7 END
```

Listing 5: PreviewPix

```
PROCEDURE PreviewPix
0000 (* This procedure will open an overlay window over KISSDraw and
003F (* display the work you have recorded into the data structure
007D (* picture. KISSDraw's screen will be saved underneath it.
```

Insert type statements from Figure 1

```
0259 TYPE Drawing=Loc:origin; Tool:object
026E PARAM Event:packet; Picture(20):Drawing
0284 DIM GoBack:STRING[1]
0290
0291 GoBack:=""
```


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just for the fun of it. Another handy addition is the procedure `ErasePix`, which you access from the file menu. It merely erases the screen at this time. It does not null the array picture to zero yet. We will probably rewrite it to work that way soon.

We revamped the `HandleMenu` procedure this month because I didn't like the feel of the "user interface" in last month's code. This time we attempted to emulate the way a Macintosh menu works. The patient lived. We also give you the option to set `Event.Status.RecordOn` to true or false from the menu. Using this switch, you can turn the recording on and off at will, saving only the mouse moves you want to the final picture.

After reading the descriptions of the `Arc` routines in the windows section of the OS-9 Level II manual and the BASIC09 manual another dozen times and running scores of experiments, the light bulb finally came on. The secret, for us, was found by emulating the algorithm described in the OS-9 manual `Arc` section manually. We physically drew a line in each quadrant and then drew an arc from that line in a clockwise direction from the ending point of the line to the beginning point. Once we did this, the order we had to use to send the line information to the screen became obvious. It's hard to admit it took several days to figure this one out.

That's `KISSDrawPut` in a nutshell. Study the listings and experiment. Hopefully before too long we'll add a routine that lets you print a hard copy of your picture. We're anxious to add the procedure to determine the screentype and set the scale field. And we can't wait to add a color menu bar along the top of the screen. And, when we were working on the line command, we figured out how to do polygons. And we have to design that data type to save irregular objects. Now, if someone would just tell us how to handle layering!

Well, that is about all we have room for this month. We'll have to pick up the subject again in January. You should have plenty of work to do with what is here. The remaining listings will appear next month. After you finish entering those, you will have a near-complete version of `KISSDraw`. At that point, we can begin to make some refinements.

Enjoy your holiday season, drive carefully and join us next month for the 1988 edition of *RAINBOW's* Beginners Issue. Till then, keep on drawing! □

```

0298      RUN gfx2("OWSet",1,0,0,80,24,0,2)
02BA      PUT #1,Picture
02C3      WHILE GoBack="" DO
02CF          RUN InKey(GoBack)
02D9      ENDWHILE
02DD      RUN gfx2("OWEnd")
02EA      END

```

Listing 6: ErasePix

```

PROCEDURE ErasePix
0000      (* This procedure gives you a way to erase your
0030      (* CoCo III screen when your artwork goes down hill and
0067      (* you want to start again.

```

Insert type statements from Figure 1

```

0221      PARAM Event:packet
022A
022B      RUN gfx2("clear")
0238      RUN KISSdMenu(Event)
0242      END

```

Listing 7: HandleMenu

```

PROCEDURE HandleMenu
0000

```

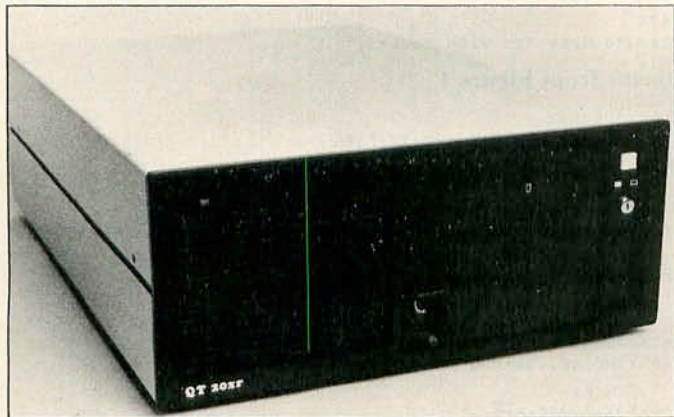
Insert type statements from Figure 1

```

01A0      TYPE drawing=loc:origin; tool:object
01A1      PARAM Event:packet; Picture(20):drawing
01C0
01CD      DIM Menu(6):STRING[14]
01DE      DIM FileAction:STRING[25]
01EA      DIM MenuCur,Item:INTEGER
01F5
01F6      DATA "ErasePix","LoadPix","PreviewPix","SavePix","RecordOn"
          , "RecordOff"
023D
023E      FOR Item:=1 TO 6
024E          READ Menu(Item)
0257      NEXT Item
0262
0263      RUN gfx2("OWSet",1,10,0,16,8,0,2)
0285      RUN gfx2("boldsw","on")
0298      RUN gfx2("CurXY",0,0)
02AB      PRINT "F I L E "
02BB      RUN gfx2("boldsw","off")
02CF      FOR Item:=1 TO 6
02DF          PRINT Menu(Item)
02E7      NEXT Item
02F2
02F3      REM while the mouse button is down
0314      REM and in the overlay menu window
0335      REM flash the menu item the mouse is on
035B      WHILE Event.mouse.CBSA<>0 AND Event.mouse.Stat=0 DO
037A          RUN getKISSMouse(Event)
0384          MenuCur:=INT(Event.mouse.AcY/8)
0397          Item:=MenuCur
039F          IF MenuCur>0 AND MenuCur<7 THEN
03B2              RUN gfx2("revon")
03BF              RUN gfx2("CurXY",0,MenuCur)
03D4              PRINT Menu(Item)
03DC              RUN gfx2("RevOff")
03EA              RUN gfx2("CurXY",0,MenuCur)
03FF              PRINT Menu(Item)
0407          ENDIF
0409      ENDWHILE
040D      RUN gfx2("OWEnd")
041A
041B      REM Drop out of loop when mouse button is opened
044A      REM If mouse was on menu item then
046C      REM run the procedure the button was over
0494      IF MenuCur>0 AND MenuCur<7 AND Event.mouse.AcX>80 AND Event.mouse.AcX
          <128 THEN
04C1          FileAction:=TRIM$(Menu(Item))
04CD          IF FileAction="RecordOn" THEN
04E1              Event.status.RecordOn:=TRUE
04EE          ELSE

```


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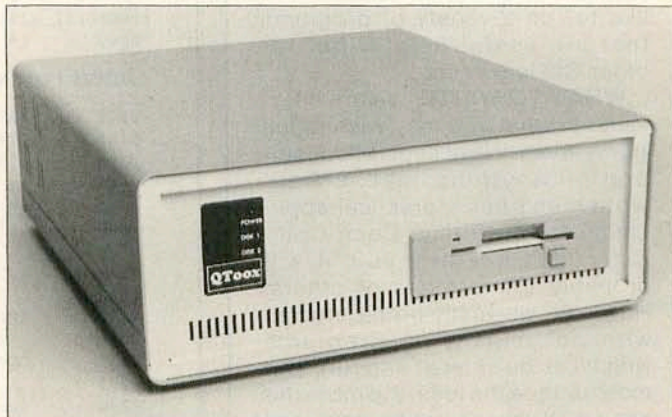
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```

04F2      IF FileAction="RecordOff" THEN
0507          Event.status.RecordOn:=FALSE
0514      ELSE
0518          RUN FileAction(Event,Picture)
0527      ENDIF
0529      ENDIF
052B      ENDIF
052D      END
052F

```

Listing 8: KISSDrawArc

```

PROCEDURE KISSDrawArc
0000      (* Program to Draw Arc with Mouse

```

Insert type statements from Figure 1

```

01C2      PARAM Event:packet
01CB      DIM StartX,StartY,CurrX,CurrY:INTEGER
01DE      DIM XPos,YPos:BOOLEAN
01E9
01EA      (* Enable XOR logic, then
0203      (* let cursor follow mouse until button is pushed
0234
0235      RUN gfx2("logic","xor")
0248
0249      REPEAT
024B          RUN getKISSmouse(Event)
0255      UNTIL Event.mouse.CBSA<>0 AND Event.mouse.AcX>40
0273
0274      StartX:=Event.mouse.BDX
0282      StartY:=Event.mouse.BDY
0290      CurrX:=Event.mouse.AcX
029E      CurrY:=Event.mouse.AcY
02AC
02AD      WHILE Event.mouse.CBSA<>0 DO
02BF          RUN getKISSmouse(Event)
02C9
02CA      Event.Pen.DCode:=Event.Code.DSetPtr
02DF      Event.Pen.HorP:=StartX
02EE      Event.Pen.VerP:=StartY+(CurrY-StartY)
0305      PUT #1,Event.Pen
0312
0313      IF CurrX<>Event.mouse.AcX OR CurrY<>Event.mouse.AcY THEN
0334
0335      REM Print over old arc to delete it
0357      Event.Pen.DCode:=ABS(CurrX-StartX) \Event.Pen.HorP:=ABS
          (CurrY-StartY)
037F
0380      XPos:=CurrX-StartX>0 \YPos:=CurrY-StartY>0
039E      IF YPos AND NOT(XPos) THEN 100
03AF      IF YPos OR NOT(YPos) AND NOT(XPos) THEN
03C2          Event.Pen.VerP:=0
03D0          Event.Handle.DPSCode:=StartY-CurrY
03E3          Event.Handle.HanX:=CurrX-StartX
03F6          Event.Handle.HanY:=0
0404      ELSE
0408 100      Event.Pen.VerP:=CurrX-StartX
041E          Event.Handle.DPSCode:=0
042C          Event.Handle.HanX:=0
043A          Event.Handle.HanY:=StartY-CurrY
044D      ENDIF
044F
0450      PUT #1,Event.Code.DArc
0460      PUT #1,Event.Pen
046D      PUT #1,Event.Handle
047A
047B      REM Now update Current position of mouse and redraw
04AD      CurrX:=Event.mouse.AcX
04BB      CurrY:=Event.mouse.AcY
04C9
04CA      REM Must UpDate Draw Pointer Here
04EA      Event.Pen.DCode:=Event.Code.DSetPtr
04FF      Event.Pen.HorP:=StartX
050E      Event.Pen.VerP:=StartY+(CurrY-StartY)
0525      PUT #1,Event.Pen
0532
0533      Event.Pen.DCode:=ABS(CurrX-StartX) \Event.Pen.HorP:=ABS
          (CurrY-StartY)
055B
055C      XPos:=CurrX-StartX>0 \YPos:=CurrY-StartY>0
057A      IF YPos AND NOT(XPos) THEN 200

```



```

058B      IF YPos OR NOT(YPos) AND NOT(XPos) THEN
059E          Event.Pen.VerP:=0
05AC          Event.Handle.DPSCode:=StartY-CurrY
05BF          Event.Handle.HanX:=CurrX-StartX
05D2          Event.Handle.HanY:=0
05E0      ELSE
05E4 200    Event.Pen.VerP:=CurrX-StartX
05FA          Event.Handle.DPSCode:=0
0608          Event.Handle.HanX:=0
0616          Event.Handle.HanY:=StartY-CurrY
0629      ENDIF
062B
062C          PUT #1,Event.Code.DArc
063C          PUT #1,Event.Pen
0649          PUT #1,Event.Handle
0656      ENDIF
0658      ENDWHILE
065C
065D      RUN gfx2("logic","off")
0670      Event.Pen.DCode:=ABS(CurrX-StartX) \Event.Pen.HorP:=ABS(CurrY
-StartY)

0698
0699      XPos:=CurrX-StartX>0 \YPos:=CurrY-StartY>0
06B7      IF YPos AND NOT(XPos) THEN 300
06C8      IF YPos OR NOT(YPos) AND NOT(XPos) THEN
06DB          Event.Pen.VerP:=0
06E9          Event.Handle.DPSCode:=StartY-CurrY
06FC          Event.Handle.HanX:=CurrX-StartX
070F          Event.Handle.HanY:=0
071D      ELSE
0721 300    Event.Pen.VerP:=CurrX-StartX
0737          Event.Handle.DPSCode:=0
0745          Event.Handle.HanX:=0
0753          Event.Handle.HanY:=StartY-CurrY
0766      ENDIF
0768
0769          PUT #1,Event.Code.DArc
0779          PUT #1,Event.Pen
0786          PUT #1,Event.Handle
0793          Event.Handle.DPSCode:=Event.Code.DSetPtr
07A8      END

```

Listing 9: KISSHandleText

```

PROCEDURE KISSHandleText
0000      (* Procedure to type text at position
0025      (* selected with graphics cursor

Insert type statements from Figure 1

01E6      PARAM Event:packet
01EF
01F0      DIM CharPosX,CharPosY:INTEGER
01FB      DIM char:BYTE
0202
0203      (* We'll use the vertical bar cursor
0229      (* that represents a text insert point
024F
0250      RUN gfx2("gcset",202,6)
0263
0264      REPEAT
0266          RUN getKISSmouse(Event)
0270      UNTIL Event.mouse.CBSA<0 AND Event.mouse.AcX>40
028E
028F      (* Now we must translate the pixel position
02BA      (* returned to a character position
02DD
02DE      CharPosX:=Event.mouse.AcX/8
02EF      CharPosY:=(Event.mouse.AcY+5)/8
0303
0304      (* Now we can position the cursor
0325
0326      RUN gfx2("CurXY",CharPosX,CharPosY)
033D
033E      (* Make sure Echo is off
0356      SHELL "tmode -echo"
0365      WHILE char<13 DO \REM Carriage Return
0383          GET #0,char
038C          PUT #1,char
0395      ENDWHILE
0399      SHELL "tmode echo"
03A7      END
03A9
03AA
03AB

```

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Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be very short.

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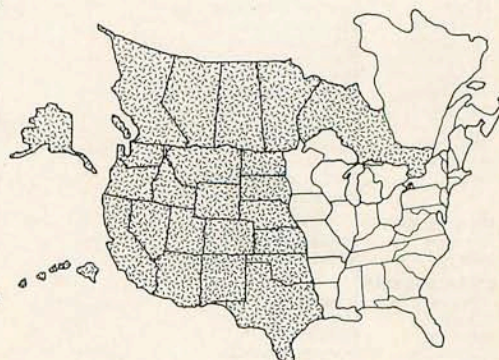
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- MF 13 - Additional problems using percents
- MF 14 - Word problems using percents
- MF 15 - Finding circle area using pi
- MF 16 - Using a ruler to measure fractions

2 MATH/BASIC ALGEBRA For all grades Sixteen lessons: MBA-1 to 16

3 MATH/NUMBERS For grades 1 to 6 Sixteen lessons: MN-1 to 16

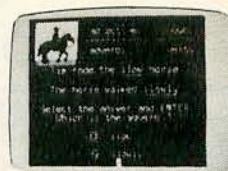
SELF DEVELOPMENT

Writing effectively means communicating effectively. Through the writing series of lesson students of all ages will develop basic skills needed to turn thoughts and ideas into expressive words and phrases.

4 RULES OF WRITING For all grades Sixteen lessons: RW-1 to 16

LANGUAGE ARTS

A practical education begins with good reading skills and is continued with increased vocabulary comprehension and, of course, spelling. Your child will learn that reading is fun while they are also learning when to use "to," "too," and "two," and how to spell when building a vocabulary.



5 THE MAGIC OF SPELLING Grades 4 to 8

- MS 1 - Plurals: branches, rodeos, valleys
- MS 2 - Plurals: houses, brushes, candies
- MS 3 - Plurals: babies, pianos, leaves
- MS 4 - Suffixes: boxed, referred, writing
- MS 5 - Suffixes: paid, quickly, extremely
- MS 6 - Suffixes: said, confusion, school's
- MS 7 - Homonyms: two, too, to; their, there
- MS 8 - Homonyms: our, are, hour; ate, eight
- MS 9 - Homonyms: weight, wait; who's, whose
- MS 10 - Homonyms: scent, cent; sell, cell
- MS 11 - Homonyms: dew, due; course, coarse
- MS 12 - Homonyms: cite, site, sight; by, buy
- MS 13 - Homonyms: blue, blew, creek, creak
- MS 14 - Homonyms: sale, sail; steel, steal
- MS 15 - Spelling by Syllables: letter, color
- MS 16 - Doubling Consonant Letters: hollow

6 VOCABULARY COMPREHENSION Grades 3 to 5 Sixteen lessons: VC-1 to 16

7 READING COMPREHENSION For all grades Sixteen lessons: DRC-1 to 16

8 SCIENCE SCIENCE/PHYSICS For all grades Sixteen lessons: SP-1 to 16

9 HISTORY AMERICAN HISTORY For grades 4 to 12 Sixteen lessons: AH-1 to 16

So there it is . . . no-nonsense subject matter presented in a way that maximizes understanding and retention.

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YORK 10 is now offering, for a limited time, a complete set in any subject, 16 cassettes, one lesson on each cassette, for only \$49.95. We originally offered only 8 cassettes for the same amount so now it's twice the value. The same 16 cassettes are sold elsewhere for over \$150.

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The DC-4 is a scaled-down version of the popular DC-2 without a parallel port. It includes a switch with 2 ROM sockets, JDOS, manual and such features as gold connectors and metal box. It accesses double sided drives and accepts RSDOS 1.1 for Radio Shack compatibility.

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ROM chip fits inside disk controller. 24 pin fits both J&M and RS controller Release 1.1. For CoCo 3 Compatibility.

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DRIVE 0 + Howards Drive 0 gives you a DD-3 MPI drive, a CA-1 cable and a J&M DC-4 Disk Controller for only. Add \$34 for a Disto DC-3 replacement. (\$5 shipping)

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DD-2 A TEAC 55B 1/2 height, double density, 360K disk drive in a 1/2 height case and heavy-duty power supply.

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SP-C

Serial to parallel converter converts the CoCo 4 pin serial output to run a parallel printer like Star or Epson. Includes all cables. Add \$10 for modem attachment.

(\$2 shipping) **\$68.45**

CA-1 Cable that connects the disk controller to the drive.

\$24.95 One Drive

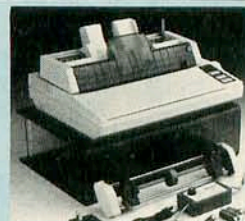
CA-2 **\$29.95** Two Drive

GUARANTEE — Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out, test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back (less shipping).

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New basic driver runs word pack without need for an OS-9.

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BULLETS	47
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GRENADES	38

Requires 64 k and one joystick. For the Coco 1, 2 or 3

GRANDPRIX CHALLENGE

Race alone against the computer, or with a friend against the computer in this high speed racing game. You compete in 5 lap races around twisting and turning race courses. Finish the race ahead of all the computer cars and you will progress to a more challenging course. Collect repair tools as you race around the track and you will be able to increase the speed and handling of your race car. But watch out for oil slicks and water puddles on the track or you might find your car crashing into a wall. Detailed 320x200 graphics and realistic driving conditions make this a must for your Coco 3 collection. Many different race tracks will keep you challenged.

Tape or Disk **\$28.95 U.S. \$38.95 Can.**
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It's back and better than ever. It's Gantelet II for your Coco 3. Using 320 x 200 hi-res graphics with 16 colors, we have created one of the best arcade style games you will ever see for your Coco. Four people can now play simultaneously in one game. Dozens of new levels with new monsters will challenge even the best players. Collect keys to open doors and chests, treasures, and many new magic potions to help you battle more powerful monsters. Watch out for hidden traps as you search for the exit to next level.

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SCORE:	5,858
ORC	HEALTH: 668
SCORE:	
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Requires 128 k Coco 3

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PYRAMIX is a 100% machine language game written exclusively to take advantage of all the power in your 128K CoCo 3. The colors are brilliant, the graphics sharp, the action hot.

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Dr. Preble's Prescriptions

BASIC FREEDOM! No one wants to be chained down. And yet, if you type in BASIC programs, you have been subject to involuntary servitude! The culprit? BASIC's limited EDIT command.

Demand your BASIC FREEDOM! Programmed by Chris Babcock for ColorVenture, this software gives you a full screen editor for typing in and editing BASIC programs! Move the cursor anywhere on the screen. Insert, delete or add text. It's the same concept as in a word processor, except you never have to leave BASIC! BASIC FREEDOM is an invisible machine language program which you can turn on and off at will. Even pressing RESET will not hurt your BASIC FREEDOM! Simple, yet powerful with an easy to read manual. Many extra "nice touches" included, like KEY REPEAT and LOWERCASE INTERPRETER which lets you type BASIC commands in upper or lower case for ease of programming. Translation to uppercase is automatic for commands. Text in quotes is not affected. For CoCo 1 2 or 3!

SPECIAL COCO 3 VERSION lets you work in 32, 40, or 80 column display modes. A separate version is available for the CoCo 1 and 2. Available on disk for \$24.95 + s/h.

MENTAL FREEDOM by Dr. Preble! IMAGINE! Some day, a computer so advanced that it responds to your very thoughts and emotions. Imagine, some day, thought-controlled graphics: levitation and materialization! **PLUG IN YOUR MIND AND UNHOOK YOUR JOYSTICKS**—that day is now! The Radio Shack Color Computer has many advanced capabilities, just waiting to be tapped. Dr. Preble's Programs combines the advanced technology of the CoCo with the amazing Radio Shack Biofeedback Monitor to bring you "Mental Freedoms."

For CoCo 2 or 3

THOUGHT-CONTROLLED VIDEO CHALLENGE? Unlike any video game you have ever played, our Thoughtware tests your ability to handle stress, to remain calm under adverse circumstances. **LIGHTNING FAST** reflexes will do you no good here, unless you first tame the fickle dragon of your mind. Are you the secretly nervous type? Many people can keep a "Poker Face" even when they are worried so that others may not notice; but can you really stop the worry itself? Find out with **Mental Freedom!**

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Basic Freedom



Mental Freedom



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For CoCo 1, 2 or 3

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